OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: South Coast Air Quality Management District

Address: 21865 Copley Dr

City: Diamond Bar

State: CA: California Zip Code: 91765-4178

B. DUNS No. 025986159

II. Is the applicant currently receiving EPA Assistance? ☒ Yes ☐ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

None

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☒ Yes	☐ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☒ Yes	☐ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☐ Yes	☒ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

Yes. John Olvera, Deputy Executive Officer Administrative and Human Resources: 21865 Copley Drive, Diamond Bar, Ca 91765-4178; jolvera@aqmd.gov 909-396-2309

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

Yes. A copy of the South Coast AQMD policy (Administrative Policy #22) is attached to this submission.

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Mary Leonard	Executive Officer	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: | First Name: Wayne | Middle Name:
Last Name: Nastri | Suffix:
Title: Executive Officer

Complete Address:

Street1: 21865 Copley Dr
Street2:
City: Diamond Bar | State: CA: California
Zip / Postal Code: 91765-4178 | Country: USA: UNITED STATES

Phone Number: 909-396-2100 | **Fax Number:**
E-mail Address: wnastri@aqmd.gov

Payee: *Individual authorized to accept payments.*

Name: Prefix: | First Name: Sujata | Middle Name:
Last Name: Jain | Suffix:
Title: Chief Financial Officer

Complete Address:

Street1: 21865 Copley Dr
Street2:
City: Diamond Bar | State: CA: California
Zip / Postal Code: 91765-4178 | Country: USA: UNITED STATES

Phone Number: 909-396-2804 | **Fax Number:**
E-mail Address: sjain@aqmd.gov

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: | First Name: Mary | Middle Name:
Last Name: Leonard | Suffix:
Title: Financial Analyst

Complete Address:

Street1: 21865 Copley Dr
Street2:
City: Diamond Bar | State: CA: California
Zip / Postal Code: 91765-4178 | Country: USA: UNITED STATES

Phone Number: 909-396-2780 | **Fax Number:**
E-mail Address: mleonard@aqmd.gov

EPA Form 5700-54 (Rev 4-02)

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: Prefix: | First Name: Vasileios | Middle Name:

Last Name: Papapostolou | Suffix:

Title: Program Supervisor

Complete Address:

Street1: 21865 Copley Dr

Street2:

City: Diamond Bar | State: CA: California

Zip / Postal Code: 91765-4178 | Country: USA: UNITED STATES

Phone Number: 909-396-2254 | **Fax Number:**

E-mail Address: vpapapostolou@aqmd.gov

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1234-1.Project Narrative v0.8.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

Other Attachment File(s)

*** Mandatory Other Attachment Filename:** 1235-Combine Att 2-17 v2.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. FY22 Enhanced Air Quality Monitoring for Communities	66.034	$	$	$ 499,900.00	$ 0.00	$ 499,900.00
2.						
3.						
4.						
5. Totals		$	$	$ 499,900.00	$ 0.00	$ 499,900.00

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Prescribed by OMB (Circular A -102) Page 1

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
	FY22 Enhanced Air Quality Monitoring for Communities				
a. Personnel	$	$	$	$	$
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies	136,000.00				136,000.00
f. Contractual	110,000.00				110,000.00
g. Construction					
h. Other	253,900.00				253,900.00
i. Total Direct Charges (sum of 6a-6h)	499,900.00				$ 499,900.00
j. Indirect Charges					$
k. TOTALS (sum of 6i and 6j)	$ 499,900.00	$	$	$	$ 499,900.00
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. FY22 Enhanced Air Quality Monitoring for Communities	$	$	$	$
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 166,632.00	$ 41,658.00	$ 41,658.00	$ 41,658.00	$ 41,658.00
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$ 166,632.00	$ 41,658.00	$ 41,658.00	$ 41,658.00	$ 41,658.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. FY22 Enhanced Air Quality Monitoring for Communities	$ 166,634.00	$ 166,634.00	$	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 166,634.00	$ 166,634.00	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges: 499,900

22. Indirect Charges:

23. Remarks:

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OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:	* 2. Type of Application:	* If Revision, select appropriate letter(s):
☐ Preapplication	☒ New	
☒ Application	☐ Continuation	* Other (Specify):
☐ Changed/Corrected Application	☐ Revision	

* 3. Date Received:	4. Applicant Identifier:
03/25/2022	

5a. Federal Entity Identifier:	5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:	7. State Application Identifier:
	California

8. APPLICANT INFORMATION:

* a. Legal Name:	South Coast Air Quality Management District

* b. Employer/Taxpayer Identification Number (EIN/TIN):	* c. Organizational DUNS:
95-3099419	0259861590000

d. Address:

* Street1:	21865 Copley Dr
Street2:	
* City:	Diamond Bar
County/Parish:	
* State:	CA: California
Province:	
* Country:	USA: UNITED STATES
* Zip / Postal Code:	91765-4178

e. Organizational Unit:

Department Name:	Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:		* First Name:	Vasileios
Middle Name:			
* Last Name:	Papapostolou		
Suffix:			

Title:	

Organizational Affiliation:

* Telephone Number:	909-396-2254	Fax Number:	

* Email:	vpapapostolou@aqmd.gov

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

D: Special District Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: 42 * b. Program/Project: 27-49

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 01/01/2023 * b. End Date: 12/31/2025

18. Estimated Funding ($):

* a. Federal	499,900.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	499,900.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☒ a. This application was made available to the State under the Executive Order 12372 Process for review on 03/25/2022.

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☐ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: * First Name: Wayne

Middle Name:

* Last Name: Nastri

Suffix:

* Title: Executive Officer

* Telephone Number: 909-396-2100 Fax Number:

* Email: wnastri@aqmd.gov

* Signature of Authorized Representative: Mary Leonard * Date Signed: 03/25/2022

Quality Assurance Statement

Most Quality Assurance activities for all deployed sensors will be conducted by South Coast AQMD staff working in the AQ-SPEC Program. These include Dr. Vasileios Papapostolou (Contact Principal Investigator), AQ-SPEC's Program Supervisor, who will oversee the development and implementation of the Library Program. Senior staff including Dr. Andrea Polidori (Director of Monitoring and Analysis) and Dr. Jason Low (Assistant Deputy Executive Officer) of the Science and Technology Advancement Division will provide additional support and oversight on critical Quality Assurance activities to ensure the project's success and the collection of high-quality data. Dr. Ashley Collier-Oxandale (Air Quality Specialist), Dr. Brandon Feenstra (Air Quality Specialist), and Mr. Randy Lam (Air Quality Instrument Specialist II) will organize program logistics, manage the data storage, processing, and visualization via the South Coast AQMD's AQPortal, and will coordinate fieldwork associated with sensor deployments. In addition, Dr. Wilton Mui (Air Quality Specialist) will lead laboratory activities (e.g., chamber Quality Control checks and calibrations). Participants in the Library Program will update information about sensor use in log sheets.

I. Criteria for Inclusion in the Library Program

To be considered for inclusion in the Library Program, a sensor must meet the following criteria: (1) must be a commercial device, (2) must target one or more of the following particle or gaseous pollutants: $PM_{2.5}$, PM_{10}, O_3, NO_2, or CO, (3) must meet the performance criteria shown below during an AQ-SPEC evaluation ("off-the-shelf" performance, using 5-minute averaged or similarly high time resolution data), or must have comparable performance observed in multiple studies in the scientific literature.

PERFORMANCE CRITERIA	$PM_{2.5}$	PM_{10}	O_3	NO_2	CO
Average Field R^2, strong or very strong	>= 0.7	>= 0.7	>= 0.7	>= 0.7	>= 0.7
Data Recovery (%), high or very high	> 75%	> 75%	> 75%	> 75%	> 75%
Intra-Model Variability (%), low or very low	<= 10%	<= 10%	<= 10%	<= 10%	<= 10%
Field MAE, moderate to very low	7.5 $\mu g/m^3$	15 $\mu g/m^3$	12 ppb	6 ppb	0.15pm

For sensors that meet these criteria, additional factors to be considered include intended monitoring application, user-friendliness, data accessibility, and availability of Application Programming Interfaces (APIs) for data access. All sensors to be purchased with funding allocated in the proposed budget will meet the above criteria and will be strategically selected to build a comprehensive and robust Library Program. The Library Program will offer a range of sensors intended for ambient air monitoring that vary in terms of target pollutants, monitoring application, power requirements/options (i.e., plug-in or solar), data transfer feature (i.e., over wi-fi or cellular networks), data storage. A variety of sensors will ensure a range of options to meet the interests of partner communities. In addition to ambient sensors, a smaller amount of portable handheld, wearable, and indoor sensors will also be available for supplemental monitoring.

II. Library Program Loan Procedures

All approaches to QC and sensor calibration applied to Library Program sensors, under the proposed work will rely on best-practices and build on results established in the scientific literature [1].

Bench Tests: Bench testing involves checking for the basic and expected functionality of a sensor (procedures sensor model-specific). When sensors are received, they will be bench tested and added to the program inventory. When sensors are loaned and returned, they will be bench tested again prior to being loaned to the next borrower. Bench test results will be recorded to log sheets associated with each sensor, and appropriate actions will be taken if a sensor fails a bench test (i.e., replacement or repair).

Short-term Loan QC and Chamber Calibration: In most cases, short-term loans will leverage a state-of-the-art environmental chamber for QC and calibration. For a given sensor type (based on target pollutant and operating principle), the typical ranges of known influences on that sensor's response in the South Coast Air Basin will be identified. For example, for an optical $PM_{2.5}$ sensor, these influences would include temperature, humidity, $PM_{2.5}$ concentration, and PM_{10} concentration. Then k-means cluster analysis will be employed to identify a limited, efficient set of atmospheric conditions. A sensor will then be QC'd and calibrated in an AQ-SPEC environmental chamber under this limited set of atmospheric conditions. Short-

term loans will include a "Chamber Calibration" (pre-loan) and a "Chamber Calibration Check" (post-loan). Using the "Chamber Calibration" (**pre**-loan) sensor data and data from reliable reference instruments integrated as part of the chamber set-up, various QC metrics (e.g., R^2 for linearity, Mean Absolute Error, intra-model variability for groups of multiple sensors, and percent data recovery [2]) and linear correction factors (i.e., gains for reducing differences in sensitivity and offsets for reducing differences in baselines) will be calculated. The QC metrics must be within the range of inclusion criteria cited previously, or the sensor unit to be loaned will be replaced. QC metrics and linear correction factors will be shared with the borrower, who can apply these gains and offsets during their analysis to improve the accuracy of the collected sensor data. Post-loan, the "**C**hamber Calibration Check" will occur. If there has been a substantial change to the QC metrics (e.g., the metrics are not within range of the inclusion criteria in the table above) or a substantial change to the correction factors (e.g., gain changes > 25% and/or the offset changes > 100%), staff will advise the borrower that qualitative interpretations of their data are likely reliable, but there may be limitations to the data in terms of quantitative analysis. In addition, staff will assess the sensor to determine if repair or replacement is needed. The appropriateness and effectiveness of this approach will be verified using periodic field co-locations of calibrated sensors at regulatory air monitoring stations (AMS) that are part of the AQ-SPEC program. For the chamber system, QC/calibration/maintenance will be conducted by laboratory staff according to well established SOPs.

Long-term Deployment QC and Remote Calibration: In most cases, sensors used in long-term ambient deployments will be streaming data to the AQPortal cloud platform in near-real-time via Wi-Fi or cellular. Both raw and processed data will be stored for these sensors. Data processing involves applying automated QC rules specific to each sensor type. For example, PurpleAir PA-II QC rules include a statistical comparison of data from the duplicate original equipment manufacturer (OEM) sensors in each unit. Aeroqual AQY rules include checks for flatlining, checks for whether data was collected in acceptable temperature ranges, checks for potential problems with PM sensor laser optics, checks for negative values, and the application of manufacturer specified filters. Rules will be written as needed for new sensor types based on **staff's experience and manufacturer recommendations. For** in-field remote calibration, compatible calibration techniques (accounting for local environmental, meteorological conditions and sensor capabilities and limitations) will be applied to each sensor type. For example, for Aeroqual AQY sensors, a remote calibration technique, called MOment MAtching (MOMA), where sensor data distributions are matched to data measured concurrently at assigned proxy sites, will be applied [3,4]. For Purple Air PA-II sensors, either a similar remote technique or one of the established global corrections (i.e., a single correction equation applied to all sensors of the same model) will be applied [5,6]. For new sensor types, staff will leverage proven methods (e.g., MOMA or global corrections) and will work with manufacturers to determine the optimal remote calibration approach. Remote QC and calibration procedure effectiveness and appropriateness will be tracked using sensors co-located at AMS sites to assure high data quality is maintained. Finally, staff will track sensor health over time using existing data management dashboards, which, combined with the applied QC rules, will help alert staff when sensors need replacement or maintenance. Maintenance and troubleshooting in the field will include steps such as performing a power cycle, cleaning out sampling path, checking for software issues, checking wired/contact connections, voltage testing of power source, testing alternative power outlets, and replacing raw sensors and/or entire unit, as needed. In addition, staff will train and assist participants to ensure appropriate siting and deployment of sensors for ambient monitoring (e.g., ensuring appropriate height and distance from surfaces and potential sources). distance from surfaces and potential sources).

References: [1] Hagler et al., 2018 (DOI: 10.1021/acs.est.8b01826) [2] https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=350785&Lab=CEMM;
[3] Miskell et al., 2019 (DOI: 10.1016/j.atmosenv.2019.116870); [4] Weissert et al., 2020 (DOI: 10.1016/j.atmosenv.2020.117428); [5] Schulte et al., 2020 (DOI: 10.1088/1748-9326/abb62b); [6] Barkjohn et al., 2021 (DOI: 10.5194/amt-14-4617-2021)

VASILEIOS PAPAPOSTOLOU, Sc.D.
Program Supervisor
South Coast Air Quality Management District, 21865 Copley Drive, Diamond Bar, CA 91765
Phone: (909)-396-2254 Fax: (909)-396-3253 E-mail: vpapapostolou@aqmd.gov

Professional Preparation

Sc.D. (Environmental Health) 2011
Harvard University, Cambridge, Massachusetts
M.S. (Exposure Assessment)
Harvard University, Cambridge, Massachusetts 2006
B.S. (Chemical Engineering)
National Technical University of Athens, Greece 2003

Position/Appointments

2018 – Present: *Program Supervisor,* Air Quality Sensor Performance Evaluation Center (AQ-SPEC); Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD)
2015 – 2018: *Air Quality Specialist,* AQ-SPEC; Science & Technology Advancement, South Coast AQMD
2011 – 2015: *Post-doctoral Research Fellow;* Harvard University, Cambridge, Massachusetts

Professional Service

- Supervise the AQ-SPEC Group and provide oversight and guidance for the South Coast AQMD air quality sensor related programs and project applications; 2018 – Present
- Project Lead, U.S. EPA STAR Grant **"Engage, Educate and Empower California Communities on the** Use and Applications of Low-cost Air M**onitoring Sensors";** 2016 – Present
- Co-Principal Investigator, U.S. DOE Building America – ASTM International D8405-21 Standard Test Method for PM2.5 and CO2 Sensors or Sensor Units Used in Indoor Air Applications; 2017 – Present
- Co-Principal Investigator, ASTM International Standard Test Method for Ambient, Outdoor Air Sensors and Other Sensor-based Instruments Test; 2018 – Present
- Member, Monitoring Committee, National Association for Clean Air Agencies (NACAA); 2020 – Present
- Member, Monitoring Committee, California Air Pollution Control Officers Association (CAPCOA); 2020 – Present
- Member, Technical Advisory Committee, Ventura County Air Pollution Control District California Assembly Bill 617; 2018 – Present
- Member, Planning and Technical Committee, Air Sensors International Conference; 2022, 2020
- Grand Award Judge, International Science and Engineering Fair; 2017 – Present
- Member, Judging Advisory Committee, California Science and Engineering Fair; 2016 – Present
- Organizer, South Coast AQMD Making Sense of Sensors Conference; 2017
- Member, U.S. EPA Harvard Clean Air Research Center; 2011 – 2015
- Member, U.S. EPA Harvard Center for Ambient Particle Health Effects; 2006 – 2011
- Reviewer, Scientific journals: Sensors, Atmospheric Environment, International Journal of Environmental Research and Public Health, Inhalation Toxicology; 2011 – Present

Invited Presentations

- U.S. EPA – Office of Air and Radiation, Air Sensors Internal Webinar Series, ***"Development of an ASTM International D8405-21 Standard Test Method for PM2.5 Sensors or Sensor Units Used in Indoor Air Applications"*** **January 2022**
- NACAA – Bi-Monthly Public Outreach Committee Meeting, ***"Community in Action: A Comprehensive Educational Toolkit on Air Quality Sensors"*** **January 2022**
- U.S. EPA – Office of Research and Development, Internal Working Group meeting, ***"Community in Action: A Comprehensive Educational Toolkit on Air Quality Sensors"*** **January 2022**
- CAPCOA – Monthly Monitoring Committee Meeting, ***"Community in Action A Comprehensive Educational Toolkit on Air Quality Sensors"*** **October 2021**
- NACAA – Bi-Monthly Monitoring Committee Meeting, ***"Community in Action: A Comprehensive Educational Toolkit on Air Quality Sensors"*** **October 2021**
- American Chemical Society – Orange County Environmental Group, ***"Air Quality Sensors: An Overview of Performance Evaluation, Network Design, and Data Handling"*** **October 2019**

Select Publications

Collier-Oxandale A, **Papapostolou V**, Feenstra B, Der Boghossian B, Polidori A. Towards the Development of a Sensor Educational Toolkit to Support Community and Citizen Science. *Sensors for Indoor and Outdoor Air Quality Monitoring: From Research to Citizen Science Applications*, in press

Connoly RE, Wang Z, Chen Y, Liu JZ, Collier-Oxandale A, **Papapostolou V**, Polidori A, Zhu Y. **2021**. Long-term Evaluation of a Low-cost Air Sensor Network for Monitoring Indoor and Outdoor Air Quality at the Community Scale. *Science of the Total Environment*, 807(2):150797.

Collier-Oxandale A, Feenstra B, **Papapostolou V**, Polidori A. **2021**. AirSensor v1.0: Enhancements to the Open-source R Package to Enable Deep Understanding of the Long-term Performance and Reliability of PurpleAir Sensors. *Environmental Modelling & Software*, 148:105256.

Mui W, Der Boghossian B, Collier-Oxandale A, Boddeker S, Low J, **Papapostolou V**, Polidori A. **2021**. Development of a Performance Evaluation Protocol for Air Sensors Deployed on a Google Street View Car. *Environmental Science & Technology*, 55(3):1477–1486.

Feenstra B, Collier-Oxandale A, **Papapostolou V**, Cocker D, Polidori A. **2020**. The AirSensor Open-source R-package and DataViewer Web Application for Interpreting Community Data Collected by Low-cost Sensor Networks. *Environmental Modelling & Software*, 134:104832.

Collier-Oxandale A, Feenstra B, **Papapostolou V**, Zhang H, Kuang M, Der Boghossian B, Polidori A. **2020**. Field and Laboratory Performance Evaluations of 28 Gas-phase Air Quality Sensors by the AQ-SPEC Program. *Atmospheric Environment*, 220:117092.

Feenstra B, **Papapostolou V**, Der Boghossian B, Cocker D, Polidori A. **2019**. Development of a Network of Accurate Ozone Sensing Nodes for Parallel Monitoring in a Site Relocation Study. *Sensors*, *20*(1):16.

Feenstra B, **Papapostolou V**, Hasheminassab S, Zhang H, Der Boghossian B, Cocker D, Polidori A. **2019**. Performance Evaluation of Twelve Low-cost PM2.5 Sensors at an Ambient Air Monitoring Site. *Atmospheric Environment*, 216:116946.

Miskell, G., Alberti, K., Feenstra, B., Henshaw, G.S., **Papapostolou, V.**, Patel, H., Polidori, A., Salmond, J.A., Weissert, L.F., Williams, D. **2019**. **"Reliable data from low-cost ozone sensors in a hierarchical network"** Atmospheric Environment; DOI: 10.1016/j.atmosenv.2019.116870

Hagler GSW, Williams R, **Papapostolou V**, Polidori A. **2018**. Air Quality Sensors and Data Adjustments Algorithms: When Is It No Longer a Measurement? *Environmental Science & Technology*, DOI: 10.1021/acs.est.8b01826.

Papapostolou V, Zhang H, Feenstra B, Polidori A. **2017**. Development of an Environmental Chamber for Evaluating the Performance of Low-cost Air Quality Sensors Under Controlled Conditions. *Atmospheric Environment,* 171:82-90.

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Director of Monitoring and Analysis

South Coast Air Quality Management District, 21865 Copley Drive, Diamond Bar, CA 91765
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Education

Ph.D. (Environmental Sciences) 2005
Rutgers University, Graduate School-New Brunswick, NJ
B.S. (Environmental Sciences)
Graduated Summa Cum Laude at Urbino University, Italy 2000

Positions/Appointments

2021-Present: Director of Monitoring and Analysis; Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD), Diamond Bar, CA
2016-2021: *Advanced Monitoring Technologies Manager*; Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD), Diamond Bar, CA
2013-2016: *Quality Assurance Manager*; Science & Technology Advancement, South Coast AQMD, Diamond Bar, CA
2009-2013: *Air Quality Specialist*; Science & Technology Advancement, South Coast AQMD, Diamond Bar, CA
2007-2012: *Research Assistant Professor*; Department of Civil and Environmental Engineering, University of Southern California, Los Angeles, CA
2005-2007: *Post-doctoral research Associate;* Department of Civil and Environmental Engineering, University of Southern California, Los Angeles, CA

Research and Work Experience

- Taught Environmental Engineering classes and courses at the University of Southern California, Los Angeles, CA
- Supervised a multidisciplinary investigation aimed to study the composition, sources, spatial and seasonal characteristics, and toxicological properties of coarse PM in the Los Angeles Basin
- Developed and implemented quality assurance control methods, plans, procedures, and quality systems for the South Coast AQMD's Monitoring and Analysis program
- Conduced and supervised ambient methane measurements using a mobile platform during the Aliso Canyon Gas Leak in 2015-2016
- Managed South Coast AQMD's ambient air monitoring network operations, special monitoring programs, and related projects
- Responsible for South Coast AQMD's Air Quality Sensor Performance Evaluation Center (AQ-SPEC), which was created to conduct comprehensive performance tests of commercially available, low-cost air quality sensors
- Responsible for South Coast AQMD's fence-line air monitoring program, which was created to demonstrate the capabilities of optical remote sensing technologies for measuring refinery and other industrial emissions
- Responsible for the monitoring activities related to the implementation of Assembly Bill (AB) 617, a State Law which was created to address the disproportionate impacts of air pollution in environmental justice communities

- Responsible for the implementation of South Coast AQMD's Rule 1180, which requires all large petroleum refineries in the Los Angeles Basin to collect emission data at their fenceline and to fund air monitoring activities in nearby communities

Professional Service

- 2020-present: Member of the Aliso Canyon Disaster Scientific Oversight Committee
- 2019-present: Advisory board member for safecast.org
- 2018-present: Member of the National Association of Clean Air Agencies (NACAA) Air Toxics Committee
- 2017-2019: Member of the Porter Ranch Neighborhood Council Ad-Hoc Committee
- 2016-present: Member of the U.S. EPA's E-Enterprise Advanced Monitoring Project Team 1: Options and Feasibility Analysis for Independent Third Party Evaluation/Certification Program
- 2013-present: Member of the California Air Pollution Control Officers Association (CAPCOA) Air Monitoring working group. CAPCOA Monitoring Committee Co-Chair (2017) and Chair (2018)
- 2013-present: Working-group member for the U.S. EPA's National Air Toxics Trends Stations (NATTS) and Photochemical Assessment Monitoring Station (PAMS) programs
- 2007-2009: Peer Review Panel member for the EPA/STAR Grant Program
- Served as a reviewer for the following scientific journals: Aerosol Science & Technology, Atmospheric Chemistry and Physics, Atmospheric Environment, Environmental Science and Pollution Research, Environmental Science & Technology, Indoor Air, Journal of the Air & Waste Management Association and Science of the Total Environment

Publications (from over 60 research articles; for a more complete list please visit:
https://www.researchgate.net/profile/Andrea_Polidori)

Collier-Oxandale A, Papapostolou V, Feenstra B, Der Boghossian B, **Polidori A.** "Towards the Development of a Sensor Educational Toolkit to Support Community and Citizen Science. Citizen Science: Theory and Practice", in press

Connoly RE, Wang Z, Chen Y, Liu JZ, Collier-Oxandale A, Papapostolou V, **Polidori A**, Zhu Y. (2021) "Long-term Evaluation of a Low-cost Air Sensor Network for Monitoring Indoor and Outdoor Air Quality at the Community Scale" Science of the Total Environment, 807(2):150797

Collier-Oxandale A, Feenstra B, Papapostolou V, **Polidori A.** (2021) "AirSensor v1.0: Enhancements to the Open-source R Package to Enable Deep Understanding of the Long-term Performance and Reliability of PurpleAir Sensors" Environmental Modelling & Software, 148:105256

Mui W., Der Boghossian B., Collier-Oxandale A., Boddeker S., Low J., Papapostolou V., and **Polidori A.** (2021) "Development of a Performance Evaluation Protocol for Air Sensors Deployed on a Google Street View Car." Environmental Science & Technology 55, no. 3: 1477-1486

Collier-Oxandale A., Feenstra B., Papapostolou V., Zhang H., Kuang M., Der Boghossian B., and **Polidori A. (2019) "Field and laboratory performance evaluations of 28 gas**-phase air quality sensors by the AQ-**SPEC program" Atmospheric Environment; DOI: 10.1016/j.atmosenv.2019.117092**

Hagler G.S.W., Williams R., Papapostolou V., and **Polidori A. (2018)** "Air Quality Sensors and Data **Adjustment Algorithms: When Is It No Longer a Measurement?"** *Environmental Science & Technology*; 52(10) DOI: 10.1021/acs.est.8b01826

Papapostolou V., Zhang H., Feenstra B., and **Polidori A. (2017) "Development of an environmental** chamber for evaluating the performance of low-cost air quality sensors under controlled **conditions"** *Atmospheric Environment*; DOI: 10.1016/j.atmosenv.2017.10.003

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Professional Preparation

Ph.D., Chemistry (Specialization of Physical/Atmospheric Chemistry) 2001
University of California, Irvine
M.S., Chemistry 1997
University of California, Irvine
B.S., Chemistry and B.S., Biology 1996
University of California, Irvine

Positions/Appointments

2016-present: *Assistant Deputy Executive Officer*, Monitoring & Analysis; Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD)

2012-2016: *Atmospheric Measurements Manager*, Monitoring & Analysis; Science & Technology Advancement, South Coast AQMD

2006-2012:*Quality Assurance Manager*, Monitoring & Analysis; Science &Technology Advancement, South Coast AQMD

2006-2006: *Senior Air Quality Chemist,* Monitoring & Analysis; Science & Technology Advancement, South Coast AQMD

2001-2006: *Air Quality Chemist,* Monitoring & Analysis; Science & Technology Advancement, South Coast AQMD

PROFESSIONAL SERVICES

National Air Quality Data Exchange Committee, Member	**2019 to Present**
National Association for Clean Air Agencies, Steering Committee Member	**2015 to Present**
Primary Quality Assurance Organization Curriculum Development Committee, Member	**2013 to 2018**
National Association for Clean Air Agencies, Monitoring Committee Member	**2012 to Present**
California Air Pollution Control Officers Association, Monitoring Committee Member	**2010 to Present**
California Air Response Planning Alliance, Steering Committee Member	**2009 to Present**
Quality Assurance National Working Group, U.S. EPA, Member	**2007 to Present**
Photochemical Assessment Monitoring Program Working Group, U.S. EPA, Member	**2010 to Present**
National Air Toxics Trends Station Program Working Group, U.S. EPA, Member	**2010 to Present**
Salton Sea Science Committee, California Natural Resources, Member	**2010 to Present**

PROFESSIONAL/ SOCIETY AFFILIATIONS

Air & Waste Management Association	**2006 to Present**
American Chemical Society	**1998 to 2001 & 2006 to Present**
UCI Alumni Association, Campuswide Honors Program Chapter, President	**2004 to 2019**
American Geophysical Union	**1997 to 2001**

PUBLICATIONS

- F. E. Ahangar, P. Pakbin, S. Hasheminassab, S. A. Epstein, X. Li, A. Polidori, J.C. Low, "Long-Term Trends of PM2.5 and its Carbon Content in the South Coast Air Basin: A Focus on the Impact of Wildfires," *Atmospheric Environment*, April 2021.
- W. Mui, B. D. Boghossian, A. C.-O., S. Boddeker, J. C. Low, V. Papapostolou, and A. Polidori, Development of a Performance Evaluation Protocol for Air Sensors Deployed on a Google Street View Car, *Environmental Science & Technology* **2021** *55* (3), 1477-1486.

- S. Hasheminassab, M. H. Sowlat, P. Pakbin, A. Katzenstein, J.C. Low, A. Polidori, High time-resolution and time-integrated measurements of particulate metals and elements in an environmental justice community within the Los Angeles Basin: Spatio-temporal trends and source apportionment, *Atmospheric Environment*: X, Volume 7, 2020, 100089.
- J.C. Low, *Measurements of Ambient Naphthalene and Other Polycyclic Aromatic Hydrocarbons, MATES III, Appendix IV*, South Coast Air Quality Management District, September 2008.
- J.C. Low, *Weekday-Weekend PM2.5 Speciation Project, MATES III, Appendix X*, South Coast Air Quality Management District, September 2008.
- J. C. Low, N.Y. Wang, J. Williams and R. J. Cicerone, "Measurements of ambient atmospheric C2H5Cl and other ethyl and methyl halides at coastal California sites and over the Pacific Ocean," *Journ. Geophys. Res., 108, D19, 16, 2003*
- K. Redeker, N.Y. Wang, J. C. Low, A. McMillan, S.C. Tyler and R. J. Cicerone, "Emissions of methyl halides and methane from rice paddies," *Science*, 290, 966-969, 2000.
- L. M. Wingen, J. C. Low, and B. J. Finlayson-Pitts, "Chromatography, absorption, and fluorescence: A new instrumental analysis experiment on the measurement of polycyclic aromatic hydrocarbons in cigarette smoke," *J. Chem. Edu.*, 75, 12, 1599-1603, 1998.

ASHLEY COLLIER-OXANDALE, PhD
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Professional Preparation

Ph.D. (Environmental Engineering) 2018
University of Colorado, Boulder CO
M.S. (Civil Engineering, focus: Environmental Engineering) 2015
University of Colorado, Boulder CO
B.S. (Environmental Engineering) 2013
University of Colorado, Boulder CO

Position/Appointments

2018-present: *Air Quality Specialist,* Air Quality Sensor Performance Evaluation Center (AQ-SPEC); Science & Technology Advancement, South Coast Air Quality Management District
2013-2018: *Graduate Research Assistant,* Hannigan Air Quality and Technology Research Lab (led by Michael Hannigan, Ph.D); College of Engineering and Applied Science, University of Colorado, Boulder
2012-2013: *EJ Intern,* Environmental Justice Team, US EPA Region 8, Denver Colorado
2012-2013: *Research Assistant,* Hannigan Air Quality and Technology Research Lab; College of Engineering and Applied Science, University of Colorado, Boulder

Professional Service

- Supporting the EPA STAR Grant project "Engage, Educate and Empower California Communities on the Use and Applications of "Low-cost" Air Monitoring Sensors"; including presenting at community workshops, leading data analysis, and developing tools and resources to encourage effective use of sensors by the public (e.g., Sensor Educational Toolkit), 2018 – present
- Supporting the development of the AQPortal cloud platform; including defining QC and calibration procedures for sensors, designing data dashboards, and user acceptance testing, 2020 - present
- Supporting work with a contractor (Aeroqual Ltd.) to leverage regulatory air monitoring station data to generate and apply remote calibrations to a large-scale sensor network, 2020 - present
- Leading on tutorials on data analysis tools, incl. RStudio and the AirSensor package, 2019 – present
- Session Chair/Planning Committee for the Air Sensors International Conference (ASIC) 2022
- Presenter, Downtown LA Maker Faire, education and outreach on sensors; 2019
- Project Judge at the California Science and Engineering Fair (2019, 2021)
- Member, CU Engage Steering Committee; 2016 – 2018
- Science Advisor, community-based participatory research project examining indoor air quality with Taking Neighborhood Health to Heart (Denver-based CBO), in partnership with the American **Geophysical Union's Thriving Earth Exchange; 2015** – 2018
- Organizer, Low-Cost Air Quality Monitoring Tools Workshop, Los Angeles CA; May 2017
- Awarded CU Engage Graduate Fellowship (at CU Boulder); 2015 – 2016
- Project Lead for *Air Quality InQuiry (AQ-IQ),* an E&O program at the University of Colorado Boulder: (1) developed a peer-reviewed project-based learning curriculum published on the NSF TeachEngineering Digital Library, (2) built a loan program for air quality sensors, (3) initiated a mentorship program between HS and undergraduate students; 2013 – 2016 (program is ongoing)

Select Presentations

Collier-Oxandale A, Feenstra B, Lam R, Henshaw G, Weissert L, Papapostolou V, Polidori A, **An Overview of Low-cost Sensors, an Educational Toolkit, and Resources to Engage and Educate the Public on the Topic of Air Quality,** AGU Fall Meeting, **2021** (podium presentation)

Collier-Oxandale A, Papapostolou V, Feenstra B, Polidori A, **Leveraging a Network of Regulatory Air Monitoring Stations to Support the Long-term Deployment of Sensor Networks in Southern California Communities**, AGU Fall Meeting **2021** (podium presentation)

Collier-Oxandale A, Papapostolou V, Feenstra B, der Boghossian B, Polidori A, **An Educational Toolkit to Ensure the Successful Operation and Use of Air Quality Sensors by the Public.** American Association for Aerosol Research Conference, October **2021** (podium presentation)

Supported various internal (e.g., district-wide South Coast AQMD audience) and external (e.g., US EPA audience) AQ-SPEC presentations and workshops on final products of the EPA-**funded STAR Grant project** "Engage, Educate and Empower California Communities on the Use and Applications of "Low-**cost" Air Monitoring Sensors"**

Select Journal Publications

Collier-Oxandale A, Papapostolou V, Feenstra B, Der Boghossian B, Polidori A. **2022**. Towards the Development of a Sensor Educational Toolkit to Support Community and Citizen Science. MDPI Sensors, *in press*

Collier-Oxandale A, Feenstra B, Papapostolou V, Polidori A. **2022**. AirSensor v1.0: Enhancements to the open-source R package to enable deep understanding of the long-term performance and reliability of PurpleAir sensors, Environmental Modelling & Software, 148, 105256.

Feenstra B, **Collier-Oxandale A**, Papapostolou V, Cocker D, Polidori A. **2020**. The AirSensor open-source R-package and DataViewer web application for interpreting community data collected by low-cost sensor networks. Environmental Modelling & Software, 134, 104832.

Collier-Oxandale A, Feenstra B, Papapostolou V, Zhang H, Kuang M, Der Boghossian B, Polidori A. **2020**. Field and laboratory performance evaluations of 28 gas-phase air quality sensors by the AQ-SPEC program. Atmospheric Environment, 220, 117092.

Collier-Oxandale A, Wong N, Navarro S, Johnston J, Hannigan M. **2020.** Using gas-phase air quality sensors to disentangle potential sources in a Los Angeles neighborhood. Atmospheric Environment, 117519.

Vikram S, **Collier-Oxandale A**, Ostertag M H, Menarini M, Chermak C, Dasgupta S, Rosing T, Hannigan M, Griswold WG. **2019**. Evaluating and improving the reliability of gas-phase sensor system calibrations across new locations for ambient measurements and personal exposure monitoring. Atmospheric Measurement Techniques, 12(8), 4211-4239.

Collier-Oxandale A, Thorson J, Halliday H, Milford J, Hannigan. **2018.** Understanding the ability of low-cost MOx sensors to quantify ambient VOCs, Atmospheric Measurement Techniques, 12(3), 1441-1460.

Collier-Oxandale A, Hannigan MP, Casey JG, Piedrahita R, Halliday HS, Johnston J. **2018**. Assessing a low-cost methane sensor quantification system for use in complex rural and urban environments. Atmospheric Measurement Techniques, 11, 3569–3594.

Collier-Oxandale A, Coffey E, Thorson J, Johnston J, Hannigan M. **2018**. Comparing Building and Neighborhood-Scale Variability of CO2 and O3 to Inform Deployment Considerations for Low-Cost Sensor System Use. Sensors, 18(5), 1349.

Clements AL, Griswold, WG, RS A, Johnston JE, Herting MM, Thorson J, **Collier-Oxandale A**, Hannigan M. **2017**. Low-Cost Air Quality Monitoring Tools: From Research to Practice (A Workshop Summary). Sensors, 17, 2478.

Collier A, Knight D, Hafich K, Hannigan MP, Graves B, Polmear M. **2015.** The North Fork Valley Project – a Project-based Learning Curriculum to Support the use of Next-generation Monitoring Technologies in Rural Communities. Paper presented at the American Society of Engineering Education, Rocky Mountain Section Conference (April), **Denver CO (Awarded 'Best Paper')**

Piedrahita R, Xiang Y, Masson N, Ortega J, **Collier A**, Jiang Y, Li K, Dick R, Lv Q, Hannigan M, Shang L. **2014.** The next generation of low-cost personal air quality sensors for quantitative exposure **monitoring". Atmospheric** Measurement Techniques, 7:3325-3336.

Other Publications

Collier-Oxandale, A. 2022. Lessons and observations from engaging in CBPR as a graduate student in a STEM discipline *The Community-Based PhD: Complexities and Triumphs of Conducting CBPR*, University of Arizona Press, Ch. 27, pp. 367 - 379.

Collier-Oxandale, A. M. 2018. Enabling Community-Based Air Quality Science through the Development of Sensor Systems, Resources, and Partnerships (Doctoral dissertation, University of Colorado at Boulder)

BRANDON FEENSTRA, Ph.D.
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South Coast Air Quality Management District, 21865 Copley Drive, Diamond Bar, CA 91765
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Professional Preparation

Ph.D. (Chemical and Environmental Engineering) University of California, Riverside	2020
M.S. (Earth and Environmental Sciences) California State University, San Bernardino	2013
MPA (Public Administration) California State University, San Bernardino	2012
B.S. (Chemistry) California State University, San Bernardino	2009
B.A. (Criminal Justice) California State University, San Bernardino	2009

Position/Appointments

2017 – Present: *Air Quality Specialist,* Air Quality Sensor Performance Evaluation Center (AQ-SPEC); Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD)

2014 – 2017: *Air Quality Instrument Specialist 2,* AQ-SPEC and Quality Assurance (QA); Science & Technology Advancement, South Coast AQMD

2010 – 2014: *Air Quality Instrument Specialist 1,* Air Monitoring; Science & Technology Advancement, South Coast AQMD

Professional Service

- Project Staff, U.S. EPA STAR Grant **"Engage, Educate and Empower** California Communities on the Use and Applications of Low-**cost Air Monitoring Sensors";** 2016 – Present
- Lead Project Staff, AQPortal – South Coast AQMD cloud-based data management platform to ingest, process, analyze, visualize, and communicate air quality sensor data; 2017 - Present
- Project Staff, AirSensor R Package and DataViewer Application development to manage and visualize data from air quality sensor networks; 2017 – 2021
- Project Staff, Aeroqual Sensor Deployments in the South Coast Air Basin; 2018 - Present
- **Project Staff, U.S. EPA Contract "Spatial and Temporal Trends of Air Pollutants in the South Coast Basin Using Low Cost Sensors"**; 2016-2017
- Organizer, South Coast AQMD Making Sense of Sensors Conference; 2017
- Lead Air Quality Instrument Specialist on the Black Carbon Instrumentation Comparison study
- Reviewer, Scientific journals: ACS Sensors, Journal of Aerosol Science, Atmospheric Pollution Research, International Journal of Distributed Sensor Networks; 2020 – Present

Presentations

- 10th International Aerosol Conference (IAC), "Tutorial: *Low-**cost sensors: The "How" of Performance** Evaluation, Network Design, and Data Handling"* **September 2018**
- 10th International Aerosol Conference **(IAC),** *"Presentation: One Year Spatial and Temporal Variability of PM in a Southern California Community using an Air Quality Sensors Network"* **September 2018**

- Air Sensors International **Conference (ASIC),** *"Development of a cloud-based application to ingest, validate, analyze, and map data from a large PM sensor network"* **July 2018**

Selected Publications

Collier-Oxandale A, Papapostolou V**, Feenstra B**, Der Boghossian B, Polidori A. Towards the Development of a Sensor Educational Toolkit to Support Community and Citizen Science. *Citizen Science: Theory and Practice*, in press

Collier-Oxandale A, **Feenstra B**, Papapostolou V, Polidori A. **2021**. AirSensor v1.0: Enhancements to the Open-source R Package to Enable Deep Understanding of the Long-term Performance and Reliability of PurpleAir Sensors. *Environmental Modelling & Software*, 148:105256.

Feenstra B, Collier-Oxandale A, Papapostolou V, Cocker D, Polidori A. **2020**. The AirSensor Open-source R-package and DataViewer Web Application for Interpreting Community Data Collected by Low-cost Sensor Networks. *Environmental Modelling & Software*, 134:104832.

Collier-Oxandale A, **Feenstra B**, Papapostolou V, Zhang H, Kuang M, Der Boghossian B, Polidori A. **2020**. Field and Laboratory Performance Evaluations of 28 Gas-phase Air Quality Sensors by the AQ-SPEC Program. *Atmospheric Environment*, 220:117092.

Feenstra B, Papapostolou V, Der Boghossian B, Cocker D, Polidori A. **2019**. Development of a Network of Accurate Ozone Sensing Nodes for Parallel Monitoring in a Site Relocation Study. *Sensors, 20*(1):16.

Feenstra B, Papapostolou V, Hasheminassab S, Zhang H, Der Boghossian B, Cocker D, Polidori A. **2019**. Performance Evaluation of Twelve Low-cost PM2.5 Sensors at an Ambient Air Monitoring Site. *Atmospheric Environment*, 216:116946.

Miskell, G, Alberti, K, **Feenstra, B**, Henshaw, G, Papapostolou, V, Patel, H, Polidori, A, Salmond, J, Weissert, L, Williams, D. **2019. "Reliab**le data from low-**cost ozone sensors in a hierarchical network"** *Atmospheric Environment*; DOI: 10.1016/j.atmosenv.2019.116870

Gupta, P, Doraiswamy, P, Levy, R, Pikelnaya, O, Maibach, J, **Feenstra, B**, Polidori, A, Kiros, F, Mills, C. **2018**. Impact of California fires on local and regional air quality: The role of low-cost sensor network and satellite observations. *GeoHealth*,2, 172–181.https://doi.org/10.1029/2018GH000136

Papapostolou V, Zhang H, **Feenstra B**, Polidori A. **2017**. Development of an Environmental Chamber for Evaluating the Performance of Low-cost Air Quality Sensors Under Controlled Conditions. *Atmospheric Environment,* 171:82-90.

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Professional Preparation

Ph.D. (Environmental Science and Engineering) 2017
California Institute of Technology, Pasadena, California
M.S. (Environmental Science and Engineering)
California Institute of Technology, Pasadena, California 2012
B.S. (Environmental Engineering Sciences)
University of Florida, Gainesville, Florida 2010

Position/Appointments

2018 – Present: *Air Quality Specialist,* Air Quality Sensor Performance Evaluation Center (AQ-SPEC); Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD)
2017 – 2018: *Environmental Engineer,* Yorke Engineering, San Juan Capistrano, California
2010 – 2017: *Graduate Research Assistant;* California Institute of Technology, Pasadena, California

Professional Service

- U.S. DOE Building America – ASTM International D8405-21 Standard Test Method for PM2.5 and CO2 Sensors or Sensor Units Used in Indoor Air Applications; 2018 – Present
- South Coast AQMD AQ-SPEC – Setup and operation of a new environmental test chamber for sensor performance evaluation; 2020 – Present
- South Coast AQMD AQ-SPEC – Modeling, design, and protocol development for performance evaluation of sensors deployed on mobile platforms; 2018 – Present
- Yorke Engineering – Design of web dataviewer and alarm system for ambient odor monitoring sensor network

Select Presentations

- American Association for Aerosol Research – ***"Particle measurement on mobile platforms:*** *considerations in using reference-grade monitors, low-cost particle sensors, and particle trajectory* ***modeling"*** **October 2021**
- American Association for Aerosol Research – ***"A comprehensive test standard for indoor air quality*** *low-****cost PM2.5 sensors"*** **October 2021**

Select Publications

Mui W, Der Boghossian B, Collier-Oxandale A, Boddeker S, Low J, Papapostolou V, Polidori A. **2021**. Development of a Performance Evaluation Protocol for Air Sensors Deployed on a Google Street View Car. *Environmental Science & Technology*, 55(3):1477–1486.

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Professional Preparation

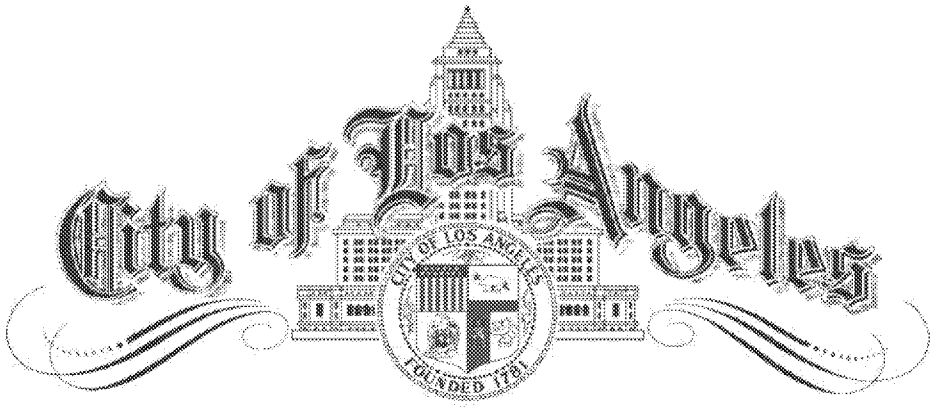
M.A. (Teaching – Secondary Sciences)
University of California, Irvine 2014
B.S. (Biological Sciences)
University of California, Irvine 2012

Position/Appointments

2019 – Present: *Air Quality Instrument Specialist II,* Air Quality Sensor Performance Evaluation Center (AQ-SPEC); Science & Technology Advancement, South Coast Air Quality Management District (South Coast AQMD)
2018 – 2019: *Air Quality Instrument Specialist I,* Atmospheric Measurements; Science & Technology Advancement, South Coast AQMD
2013 – 2016: *Science Educator; Biology, Earth Science, Oceanology and Forensic Science;* Arnold O. Beckman High School & South Torrance High School

Professional Service

- Technical Staff overseeing data quality, troubleshooting and general maintenance for network of 100+ **"Low**-cost Air Mo**nitoring Sensors" in the South Coast** Air Basin
- Project Staff engaging with community partners in AB 617 programs, school districts, municipalities and private businesses on the siting, installation, maintenance and data viewing of low-cost sensors
- Project Staff collaborating **with City of Los Angeles Mayor's Office and** Bureau of Street lighting on multi-year study using low-cost air monitoring sensors
- Technical Staff responsible for designing/building solar-powered setups for low-cost sensors
- Technical Staff responsible for setup and breakdown of fenceline sensor networks
- Project Staff responsible for discussions with vendors regarding new low-cost air sensors and identification of sensors for use in sensor library program
- Technical Staff conducting sensor deployment and data collection for AQ-SPEC field evaluations
- Technical Staff operating air monitoring stations across the south coast air basin, 2018 - 2019
- Conduct flow checks, leak tests and routine maintenance on instruments including MetOne BAM, Partisol 2025i, Teledyne T640/T640x, GRIMM EDM180, Teledyne T200, Teledyne T400, Thermo 42i, Thermo 43i Horiba 360/370, Hi-Q TSP, Hi-Q SSI, Tisch Hi-Vol, XonTech 910A Canister, and ATEC Carbonyl sampler, 2018 - 2019
- Trained in operation of Magee Scientific Aethalometer, Teledyne Ultrafine Particle Monitor, MetOne SASS and URG particulate sampler
- Presenter, Downtown LA Maker Faire, education and outreach on sensors; 2019
- Presenter, UC Davis Primary Quality Assurance Organization Training, Station Operations, 2019



ERIC GARCETTI
MAYOR

March 14, 2022

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science and Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

Re: EPA-OAR-OAQPS-22-01 - Enhanced Air Quality Monitoring for Communities

The City of Los Angeles is pleased to submit our partnership letter for the South Coast Air Quality Management District's proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program" under the EPA funding opportunity EPA-OAR-OAQPS-22-01 – Enhanced Air Quality Monitoring for Communities.

The City of Los Angeles, through efforts of achieving the goals outlined in our Green New Deal, is interested in improving air quality for residents. This is particularly true for those communities affected by environmental justice where air pollution disproportionately affects residents who are poor, minority, and historically disenfranchised. We have a robust effort to look at the way redlining, transportation, and development at the Port of Los Angeles affect environmental justice and this proposal will be a key factor to how we address this. We have partnered on many community-based air quality monitoring projects to understand and improve health outcomes for residents in underserved communities, including previous projects with the South Coast Air Quality Management District. We see this project as an additional opportunity to enhance air quality monitoring for our most vulnerable communities and collect data that can inform actions, strategic partnerships, and policies to improve air quality.

We will assist during the three-year project period by serving as a liaison to community partners in the City of Los Angeles. These activities will include helping to facilitate and attend meetings and workshops as appropriate, and include reaching out to other communities and inviting their participation in the project. In addition, we will support community partners as they develop action plans and strategies to reduce emissions and exposure in their communities, based on the results of the enhanced monitoring (e.g., sharing information about resources or programs offered by the City or information about opportunities for additional funding).

Our office will also leverage a unique partnership program with 18 area universities through our Data Science Federation (dsf.lacity.org). The program connects professors and their students with City departments to use advanced data analysis to solve real-world problems. We will leverage this program to recruit teams of students that will offer further support to partner communities for the proposed work. This support will be tailored to each community's needs and will include activities such as leading/assisting with sensor deployments and data collection, analyzing/interpreting data, drafting reports, and proposing strategies to improve local air quality. As these students will have access to monitoring equipment, related resources, and technical as well as subject-matter expertise through the South Coast Air Quality Management District, this will be a mutually beneficial opportunity.

In closing, this project would be of great value to our residents, especially residents of our environmental justice communities, by helping to reduce disparities in terms of the availability of air quality data.

Respectfully submitted,

Jeanne Holm
Deputy Mayor
Office of Budget and Innovation
City of Los Angeles

UCR CE-CERT

University of California, Riverside
College of Engineering, Center for
Environmental Research and Technology
1084 Columbia Ave
Riverside, CA 92507

March 14, 2022

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

The University of California, Riverside (UCR), College of Engineering, Center of Environmental Research and Technology (CE-CERT) is pleased to submit our partnership letter for the South Coast Air Quality Management District's proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program" under the EPA funding opportunity EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities".

UCR CE-CERT is recognized world-wide for addressing environmental challenges through our groundbreaking research in air quality, transportation, and sustainable energy production. UCR and CE-CERT are committed partners in the improvement of our community and advancing knowledge and education opportunities in these subject areas. We house one of the world's largest air quality environmental testing chambers to study air pollution and verify sensors performance. In addition, we have several ongoing projects working with the community in installing and using air sensors. These efforts are especially needed in Riverside County, where we are experiencing unprecedented growth and simultaneously battling some of the worst air quality in the nation. By better understanding our local air quality, this will enhance our ability to understand impacts of the continued growth and develop solutions to mitigate these impacts.

As part of this project UCR CE-CERT is committed to providing the following support to the project:

- Serve as a liaison between South Coast AQMD and the Community Air Board as needed to help organize meetings or workshops;
- Facilitate the participation of one or more undergraduate UCR students, who will mentor the RUSD high school students in air quality projects;
- Serve as a liaison between South Coast AQMD and the participating teachers at RUSD, and participate in the annual summit highlighting the newest monitoring studies and community efforts;
- Draft an action plan or strategies for improving local air quality based on the results of the air monitoring;

- Assist with siting sensors in the community (e.g., identifying ideal locations, potentially participating by hosting a sensor or recruiting sensor hosts); and
- Distribute the allocated funding in support of community engagement and educational activities.

Because of the quality of its team, its ambition, and impact potential, UCR CE-CERT supports AQMD's request for this monitoring proposal for funding.

Sincerely,

Matthew Barth
Yeager Families Professor, Department of Electrical and Computer Engineering
Director, Center for Environmental Research and Technology
UCR Faculty Director of Sustainability
University of California
Riverside, CA 92521
barth@ucr.edu

UCR School of Medicine
CENTER FOR HEALTHY COMMUNITIES

March 14, 2022

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

The Community Air Board (CAB) is pleased to submit our partnership letter for the South Coast Air Quality Management District's proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program" under the EPA funding opportunity EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities".

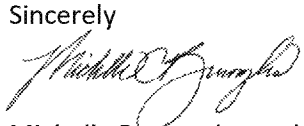
The CAB is a collection of community members from Riverside working together to build awareness and familiarity with air pollution and other environmental concerns. Led by the Center of Healthy Communities at the University of California Riverside, in cooperation with UCR CE-CERT, we hold regular meetings to coordinate community conversations and events.

For this proposed project, the CAB is prepared to take on the following roles:

- Attend/organize periodic meetings/workshops to provide community input on monitoring (over two years of the three-year grant)
- Assist with siting sensors in the community (e.g., identifying ideal locations, potentially participating by hosting a sensor or recruiting sensor hosts)
- Help in planning the end of the year summit where students and community members will share their results and findings
- Draft an action plan or strategies for improving local air quality based on the results of the air monitoring

The Riverside CAB is fully supportive of this proposed project and is hopeful that this opportunity will allow us to improve our community's awareness and understanding of our environment and health.

Sincerely



Michelle Burroughs, on behalf of Members of the CAB

Members of the CAB:

Michelle C. Burroughs, MPH (She/her/hers)
Director, Community Engagement and Outreach for the Center for Healthy Communities (CHC)
Administered by the Department of Social Medicine, Population, Public Health (SMPPH)
University of California, Riverside School of Medicine

Jennifer A. Lentz, Ph.D., Deputy Director of Programs, Coalition for Clean Air

Ivan Acquaah and Haneen Abbas, Community Scientist Team Leads, UCR CE-CERT

Dr. Eddy Jara, Project Director, County of Riverside Tobacco Control

Lillian McCandless, Environmental Science teacher JW North High School Riverside Unified School District

Sharron Lewis, First Vice President of the NAACP Riverside Branch, Riverside County Youth Council Advisor & Economic Development Chair

Ra'Niesha Bratton, Director of Community Empowerment Programs, Riverside Community Educational Foundation

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School of Medicine
CENTER FOR HEALTHY COMMUNITIES

THE CITY OF
POMONA

JAMES W. MAKSHANOFF
City Manager

Office of the City Manager

March 14, 2022

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

Regarding: Partnership for EPA ARP Funding Opportunity-- EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities"

Dear Dr. Papapostolou:

The City of Pomona is pleased to submit our partnership letter for the South Coast Air Quality Management District's (AQMD) proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program" under the EPA funding opportunity EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities".

The City of Pomona ranks high among those communities disproportionately burdened by and vulnerable to multiple sources of pollution and is looking to combat the long lasting consequences of disinvestment in the community that can be seen in the built environment, such as tree cover, freeway location and infrastructure improvements, which contribute to poor air quality and negative health outcomes. The City is committed to using a metric-driven approach to analyze these issues with the ultimate goal of creating innovative solutions to address these problems long-term. Partnering with the AQMD to enhance air quality monitoring in our community is an important step in that effort.

As a community partner, the City will contribute the following during the grant period:

- Serve as a liaison to community partner organizations throughout the project;
- Utilize the City's Public Health Fellow and Community Health Worker (funded through Prop 64 Cohort 2 grant funds awarded to the City of Pomona by the Board of State and Community Corrections) to conduct community engagement and collaborate with community partner organizations and translate key resources (e.g., the Sensor Guidebook) into Spanish;
- Assist community partners and/or community steering committees as they draft action plans to improve air quality, informed by the data collected and utilize the Public Health Fellow to develop City policies that can meaningfully address air quality impacts in Pomona through the General Plan and Zoning; and

- Help facilitate and attend meetings with community partners, education and outreach events, and meetings with community steering committees as appropriate.

The City's participation in this project will add value to other City projects championing transformative change, innovation and environmental justice, such as the City's Complete Streets Ordinance, which aims to directly improve health outcomes by fundamentally shifting the notion of public rights-of-way from one of vehicular traffic to one of a shared space to facilitate walking, cycling, and other modes of active transportation. Additionally, this effort will provide an opportunity to use human-centered design, an approach to creating a program, policy or service that is tailored to the needs of the person who will use or be impacted by it, which is a focus of the Bloomberg Harvard City Leadership Initiative and Innovation Track, which the City is participating in and using as a driver of change in City culture and practice around innovative thinking. The City looks forward to a dynamic partnership with the AQMD on this effort.

Sincerely,

James Makshanoff
City Manager

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

Concerning: Partnership for EPA ARP Funding Opportunity-- EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities".

March 10, 2022

Dear Dr. Vasileios:

Clean & Green Pomona is pleased to submit our partnership letter for the South Coast Air Quality Management District's proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program" under the EPA funding opportunity EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities".

Clean & Green Pomona is a community-based, grassroots, all-volunteer, environmental organization based in Pomona, CA. Our vision is for Pomona to become a leader in environmental justice, sustainability and health, and to develop a shared community inclusive of all who live and work here. **The mission of Clean & Green Pomona is to clean up and "green up" Pomona's industrial zones and** neighborhoods to b**enefit Pomona's health and quality of life.** Clean & Green was founded in 2012, and was incorporated later as a 501(c)3 public benefit non-profit.

Clean &Green Pomona has organized for environmentally just policy changes in Pomona. We initiated a ban on additional waste, recycling and pallet facilities and their expansion, since Pomona has over two dozen waste and recycling facilities and even more pallet businesses, and many are not adequately enforced and maintained. Clean & Green worked to increase the park development impact fee in Pomona, which had not been updated for 30 years, to bring millions of additional dollars for parks in Pomona. We advocated successfully for Pomona Unified School District to eliminate the use of diesel school buses. Our organization, working with community volunteers, has planted nearly 1,000 trees in Pomona, just to name a few of our accomplishments.

As a partner, Clean & Green Pomona will contribute the following during the grant period:

- Clean & Green Pomona will participate in the project by hosting and leading two Community Workshops, which will be opportunities for education about air quality, for discussing the results of the monitoring and the data collected, and to equip our community for engaging in **community initiatives to improve Pomona's environment.**

- Clean & Green Pomona will share local knowledge and expertise regarding air quality concerns, which will increase the relevancy of the monitoring activities.
- Clean & Green Pomona will advise on sensor siting (including helping to identify preferred public locations.) We would prefer that sensors are placed at locations such as poles, for more accurate readings than can be achieved in yards (given yard maintenance impacting the accuracy of monitoring), and that monitors be set up for on-going monitoring in Pomona, due to the substantial air quality challenges we have in our city, since we are surrounded by freeways and have two industrial zones. Clean & Green Pomona will not be placing or maintaining monitors.
- Clean & Green Pomona will also lead a Community Story Project, which will involve collecting stories from Pomona residents, who are part of Clean & Green Pomona, and our neighbors, about their experiences with air quality issues impacting their lives, and also their stories of hope as they have engaged in working for positive community change. After collecting, writing and formatting the stories, Clean & Green will work with partners from the City of Pomona and SCAQMD to display these stories alongside relevant data.
- Clean & Green Pomona leaders will participate in grant meetings and coordinate with partners as needed to accomplish the proposed work.
- Funding has been allocated in the proposed budget to support the Community Workshops and the Community Stories Project.

Thank you so much!

Sincerely,

Lisa Engdahl

Lisa Engdahl
Co-Founder and President
Clean & Green Pomona
Lisa.engdahl@gmail.com
Facebook.com/cleangreenpomona
Cleangreenpomona.org

day one

175 n. euclid ave.
pasadena, ca 91101

p 626.229.9750
f 626.765.6239

www.goDayOne.org

March 15, 2022

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

Dear Mr. Papapostolou,

Day One is pleased to submit our partnership letter for the South Coast Air Quality Management District's proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program" under the EPA funding opportunity EPA-OAR-OAQPS-22-01 – "Enhanced Air Quality Monitoring for Communities".

Day One is a community-based nonprofit organization with over 34 years of experience building healthy, vibrant cities by advancing public health, empowering youth, and igniting change. Through the years Day One's work has earned the organization countless awards, significant grant funding, and substantial public health victories that have helped address issues of inequity in vulnerable and underserved communities.

Our agency and staff are regarded as experts in youth advocacy, public health, community engagement, and environmental justice policy development throughout the Greater Los Angeles area. Our team is skilled in conducting outreach, facilitating community meetings, forming coalitions, and sharing strategies to prevent chronic disease and promote healthy, active, and sustainable communities through evidence-based policy and public health-oriented urban planning. Our team has effectively engaged the communities we serve in important conversations around:

- Healthy Food Access
- Youth Leadership & Development
- Substance Abuse Prevention and Control
- Tobacco Prevention and Control
- Active Transportation
- Access to Parks & Open Space
- Stormwater Capture & Water Resiliency
- Clean, Sustainable Energy
- Access to Clean Air

To carry out our role for this project, Day One will hire and oversee a Community Health Worker, which has been allocated in the proposed budget. Our Community Health Worker will assist the City of Pomona Community Health Worker and Public Health Fellow on community engagement, which will include facilitating community engagement with youth, non-native English language residents, and historically underrepresented populations and assist with or lead sensor deployments and support data analysis and interpretation by project partners. Finally, the Community Health Worker will assist the City of Pomona and other partners in gathering input from community members and community partners to help inform policy identification and development to improve local air quality. Throughout the project, the Community Health Worker will coordinate with other project partners and attend grant meetings as needed. Through the creation of a Community Health Worker position, we will be able to expand community capacity and help to ensure the project's success. This position will be further supported by the experience and expertise of the staff at Day One and will be an integral part of our team.

We are looking forward to partnering with South Coast AQMD and the City of Pomona on this project. Should you have any questions, please don't hesitate to reach out.

Warm Regards,

Christy Zamani,
Executive Director, Day One

CLAREMONT
McKENNA
COLLEGE

Department of Government

March 22, 2022

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

Dear Dr. Papapostolou:

This is to confirm that the Roberts Environmental Center (REC) of Claremont McKenna College is committed to collaborate with the South Coast AQMD in its project, Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program. One REC student team will be working with partners in Pomona to enhance the value of the air monitoring by conducting data analysis, compiling reports tailored to community interest and concerns, and helping to develop other products for the community. The REC has prior experience with South Coast AQMD in assisting communities with monitoring efforts, and the students will benefit from enhanced skills relating to environmental monitoring, data analysis, communicating scientific information to the public, and participating in a project involving diverse partners.

We very much look forward to collaborating again with the South Coast AQMD.

Sincerely,

William Ascher
Donald C. McKenna Professor of Government and Economic
Director, Roberts Environmental Center
Claremont McKenna College

cc: Dr. Ashley Collier-Oxandale
Ms. Kristen Miller

850 Columbia Avenue, Claremont, California 91711-6420 Tel: 909.607.8025 Fax: 909.621.8419 www.cmc.edu
Member of The Claremont Colleges

Vista Hermosa

Heights Community Group

Dr. Vasileios Papapostolou
Program Supervisor
Air Quality Sensor Performance Evaluation Center
Science & Technology Advancement
South Coast Air Quality Management District
Diamond Bar, CA 91765

Su: partnership letter

Vista Hermosa Heights Community Group is pleased to submit our partnership letter for the South Coast Air Quality Management District's proposal, "Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library **Program"** under the EPA funding opportunity EPA-OAR-OAQPS-22-01 **"** –Enhanced Air Quality Monitoring for **Communities"**.

Vista Hermosa Heights Community Group (VHHCG) was formed out of the needs of the community. Need makes for a very strong foundation and action from its members. Most of its members are long-time residents in the community. We are family and friends whose families have an average of 40 years and some as far back as 60 years here. It's been an effective group with the mindset of "see a problem, fix the problem." This has led the group into many creative solutions within dealing with Los Angeles city representatives, public safety, filming, construction, environmental justice, capping oil wells, with a goal of Equity, inclusion, and accountability in the community. Our monthly meetings are attended by City officials, LAPD, and the VHHCG members who speak directly to city departments whose responsibility it is for the issues at hand. This passion is not just contained within the meeting hours. Most notably known for our environmental work. We have worked hard to get the century-old abandoned Oil Wells capped. The safety and well-being of the community are our priority. These actions have led to Los Angeles Mayor Eric Garcetti, Councilman Gil Cedillo, U.S. Department of the Interior Secretary Deb Haaland, and other city officials meet VHHCG at Vista Hermosa Park to discuss a new infrastructure bill that would increase the safety and living conditions of Angelenos.

To support the proposed work, we will organize community meetings, workshops, and/or trainings with project partners at which residents can provide input regarding the air monitoring and learn about the results of the monitoring.

We will also assist with siting sensors, which may include advising on locations (e.g., public locations such as lamp posts), or recruiting sensor hosts to site them at their residences or businesses. To enhance the project, we will coordinate with residents, potentially including local K-12 schools, to facilitate learning opportunities (e.g., classes at local schools may use sensors from the Library Program). Finally, we will support the drafting of strategies to improve local air quality based on the results of the air monitoring.

Respectfully submitted,

Vista Hermosa Heights Community Group

Lead contacts:
Danny Luna (danny@dannyluna.com)
Rosalinda Morales (rosalindamorales2014@gmail.com)

Manifest for Grant Application # GRANT13580511

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 20202 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16012 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24017 bytes)

3. Form SF424A-V1.0.pdf (size 22684 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 22796 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15899 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37252 bytes)

Attachments Included in Zip File (total 3):

1. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1234-1.Project Narrative v0.8.pdf application/pdf (size 328414 bytes)

2. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1236-SCAQMD Admin Policy #22.pdf application/pdf (size 573796 bytes)

3. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1235-Combine Att 2-17 v2.pdf application/pdf (size 4442691 bytes)

I. COVER PAGE

Project Title: Empowering Community-based Air Quality Monitoring through the South Coast AQMD Sensor Library Program

Applicant Information:

South Coast AQMD
21865 Copley Drive, Diamond Bar, CA, 91765-3357
Vasileios Papapostolou, Sc.D.; (909)396-2254; vpapapostolou@aqmd.gov
DUNS number: 025986159

Set-Aside: NA

Brief Description of Applicant Organization: South Coast Air Quality Management District (South Coast AQMD) is the regulatory agency responsible for improving air quality for large areas of Los Angeles, Orange, Riverside and San Bernardino counties, including the Coachella Valley. The region is home to more than 17 million people–about half the population of the entire state of California. Its mission is to clean the air and protect the health of all residents in the South Coast Air District through practical and innovative strategies.

Project Partner(s):

City of Pomona (Anita Gutierrez, Anita.Gutierrez@pomonaca.gov)
Day One (Alfredo Camacho, alfredo@godayone.org)
Clean&Green Pomona (Lisa Engdahl, lisa.engdahl@servantpartners.org)
Roberts Environment Center, Claremont McKenna Coll. (William Ascher, william.ascher@claremontmckenna.edu)
University of CA, Riverside, CE-CERT (Nicole Cleary, nicole@engr.ucr.edu)
University of CA, Riverside, Community Air Board (Michelle Burroughs, michelle.burroughs@ucr.edu)
City of LA Mayor's Office (primary contact: Jeanne Holm, jeanne.holm@lacity.org)
Vista Hermosa Community Group (Rosalinda Morales, rosalindamorales2014@gmail.com and Danny Luna, danny@dannyluna.com)

Project Location: City of Pomona CA, City of Riverside CA, Vista Hermosa (a community in the City of Los Angeles, CA, zip codes: 90017, 90057, and portions of 90026)

Air Pollutant Scope: $PM_{2.5}$, PM_{10}, O_3, NO_2

Budget Summary:

EPA Funding Requested
499,900.00

Project Period: January 1, 2023 - December 31, 2025

Short Project Description: This project aims to enhance air monitoring in Southern California Environmental Justice communities by leveraging community/government/academic partnerships to deploy air quality sensors, equipped to collect high-quality data, according to a plan that reflects community concerns and questions. The collected data will inform community-led action to reduce pollutant emissions and exposures at the local level, thereby helping to reduce existing disparities in health outcomes. Solidifying the efforts of this work, South Coast AQMD's existing pilot Sensor Library Program will be enhanced and expanded to serve residents by facilitating increased monitoring in communities beyond the project period.

II. WORKPLAN

Section 1 – Project Summary and Approach

A. Overall Project: In order to enhance air monitoring in communities experiencing disproportionate pollutant exposure and health outcomes in the South Coast Air Quality Management District's (South Coast AQMD) region, this project will leverage community/government/academic partnerships to deploy air quality sensors and to develop a publicly accessible Library Program that will enable high-quality data collection and sustained air monitoring beyond the project period. Project activities will fall under three main objectives: (1) enhance and expand South Coast AQMD's existing pilot Sensor Library Program, (2) engage communities to improve local air quality, and (3) empower students with STEM (Science, Technology, Engineering, and Math) learning opportunities around air quality monitoring in support of communities. Technological advancements over the last decade have reduced the cost of air quality sensors and increased their accessibility. Moreover, accessing air quality sensors through loan programs or libraries often has the added benefit of valuable resources such as training or curriculum. Hosting of these loan programs or libraries by local or regional government agencies creates an opportunity for outreach and education as well as opportunities to develop relationships and build trust with the public. To facilitate successful sensor use and engage local Environmental Justice (EJ) communities in monitoring, the South Coast AQMD will expand and enhance its existing Sensor Library Program as part of the proposed work. The program will essentially be a "one-stop-shop" for members of the public interested in learning about their air quality, as it will include no-cost sensor loans, data analysis and visualization capabilities, educational resources, and technical support. This effort will be led by South Coast AQMD's Air Quality Sensor Performance Evaluation Center (AQ-SPEC), leveraging years of experience evaluating air quality sensor performance, engaging in sensor research, and developing resources to support sensor use (http://www.aqmd.gov/aq-spec) [1, 2, 3, 4, 5]. The program will be unique in two ways: (1) thorough sensor-specific quality control (QC) and calibration procedures will be developed and applied to enable the collection of high-quality data, and (2) in addition to short-term loans (i.e., days to weeks), opportunities for long-term (i.e., months or longer, depending on monitoring goals) sensor deployments will be enabled through partnerships with South Coast AQMD. Developing this program will involve enhancing and expanding the existing pilot Library Program, which has grown out of the California Assembly Bill (AB) 617 Program at South Coast AQMD. Similar to this proposed project, the AB 617 Program aims to enhance air monitoring efforts in EJ communities throughout California through the implementation of Community Air Monitoring Plans. Thus, the proposed work is expanding on efforts that began in six large communities in the South Coast Air Basin, broadening this type of outreach and support to other high-need communities. The proposed work will involve purchasing additional sensors and related accessories, implementing QC and calibration procedures, and finalizing loan documents. The pilot Program currently includes 51 sensors of 7 types, which offer borrowers a range of tools to support different interests, from ambient to indoor and stationary to mobile monitoring. Sensors purchased to expand the program will need to adhere to the following criteria: commercial technology, established to be well-performing and reliable based on AQ-SPEC evaluation or demonstrate comparable performance in the scientific literature, and target one or more of the following air pollutants: $PM_{2.5}$, PM_{10}, O_3, or NO_2 (more details are available in the Quality Assurance Statement). Several other activities provide a solid foundation to enhance and expand the program. Documents such as a Loan Agreement Form have been drafted and reviewed internally by our legal staff as well as used for initial loans under the pilot program. AQ-SPEC staff prepared a Quality Assurance Project Protocol (QAPP) where QC and calibration procedures are outlined; however, they have yet to be fully implemented. For QC and calibration work, AQ-SPEC staff will utilize a state-of-the-art environmental chamber to simulate conditions mirroring typical ambient conditions observed in the South Coast AQMD region. These chamber checks will provide community members, citizen scientists and other uses (borrowers) with estimated errors for each sensor's standard

output based on established performance metrics and the chamber calibration will provide linear correction factors that can be applied to increase data accuracy (more details are available in the Quality Assurance Statement). This approach will allow sensors to be calibrated on an as-needed basis, in batches, and according to a systematic procedure. However, to truly make the Library Program a "one-stop-shop", we will leverage other projects in development and previously developed resources. For example, to support needs such as device management, data storage and access, remote QC and calibration, and data analysis and visualization, this project will leverage South Coast AQMD's AQPortal. The AQPortal is a cloud-based platform with a back-end database and tools to develop custom visualizations and front-end web-based data dashboards. The platform is currently configured to receive, process, and display data from Aeroqual AQY (http://www.aqmd.gov/aq-spec/special-projects/aeroqual-aqy-deployments) and PurpleAir PA-II sensors. Similar mechanisms will be developed to import data for other sensors that are part of the Library Program to the AQPortal, including developing sensor-specific automated QC checks and applying remote calibrations (more details available in the QA statement). Note, whether remote or chamber calibration is utilized for a sensor will depend on the monitoring goals and deployment length. Once the system saves the raw and processed sensor data, community-specific data dashboards display the processed sensor data. New data dashboards may be modelled on existing dashboards or customized, meaning that the real-time data can be made available to the communities in a timely manner. The AQPortal will ensure that local air monitoring data is accessible to community partners and residents through data downloads and intuitive and engaging visuals. Additionally, work is in progress to incorporate data from other monitoring programs at South Coast AQMD as well as external sources, which will harmonize different types of air monitoring data and offer a single platform where district staff and the public can more easily access and explore the collected data. Again, building on efforts under our existing pilot Library Program, several dashboards displaying sensor data have been developed and are available for AB 617 communities (e.g., https://aqportal.aqmd.gov/public/community/1002). An important previously developed resource is the "Community in Action: A Comprehensive Educational Toolkit on Air Quality Sensors" (http://www.aqmd.gov/aq-spec/special-projects/star-grant). This Toolkit is the product of a previous US Environmental Protection Agency (EPA) Science to Achieve Results (STAR) Grant funded project entitled: "Engage, Educate, and Empower California Communities on the Use and Applications of "Low-cost" Air Monitoring Sensors". This Toolkit was shaped through collaboration with residents of 14 different California communities over five years and the experience of deploying nearly 400 air quality sensors. An essential resource in the Toolkit is a Guidebook that includes sections on air quality and monitoring background information, project planning, operating air quality sensors, understanding the data, and considering next steps. Other resources include engaging training videos, sensor installation guides, varied data analysis tools (from a sensor-agnostic data analysis guide to a sensor-specific open-source R-package titled the AirSensor package and DataViewer tool), and examples of reports and analysis produced by STAR Grant partner communities. These tools and resources will promote more effective and successful use of sensors in the expanded Library Program. In addition, under the proposed work, project partners will assist with translating key resources (e.g., the Sensor Guidebook) into Spanish, further increasing the accessibility of these resources to residents of the region. To successfully engage community members, under the second objective, we will use a range of approaches (e.g., collaborating with a Community Health Worker and forming community steering committees or CSCs). Community partners and residents will participate in multiple meetings, workshops, and trainings throughout the year that will provide an opportunity for planning the monitoring, sharing updates/progress, and discussing results. In addition, residents and community partners may participate by hosting a sensor, advising on sensors siting, or leading data analysis in their community. The project will conclude with the drafting of action plans by residents in each community. This action plan will be composed of locally relevant, community-based strategies to reduce emissions/exposure considering the monitoring results. Examples of actions and strategies may include but are not limited to local education

and outreach on tools such as the Air Quality Index (AQI) or EPA's Fire and Smoke Map, the creation of designated "clean air spaces or shelters" in the community, the implementation of school flag programs, and DIY filter solutions for indoor use during wildfire events. Government partners are key at this stage as they may be able to highlight relevant existing resources, programs, or funding opportunities. Funding for project partners will support activities such as organizing meetings/workshops, deploying or maintaining sensors, and compensation for community participants' time. Under the third objective, the project will use partnerships between communities, government, and academia to expand project capacity to the benefit of all partners. Participating teams of students will each support one community, allowing them the opportunity to contribute to monitoring projects speaking to real-world concerns. Communities will gain assistance from South Coast AQMD and participating students in deploying sensors and making sense of the data – expanding their technical capacity. At the same time, the aid of students will enable AQ-SPEC staff to focus on implementing QC and calibration on the sensor data and managing devices and data on the AQPortal. A partner community in the STAR Grant successfully used this model, working with the Roberts Environmental Center (REC) at Claremont McKenna College, producing a report that included custom data analysis and recommendations for action to reduce pollutant exposure. South Coast AQMD staff supported this partnership by assisting with sensor deployments, leading a tutorial for the students on data analysis tools, and facilitating the community meeting where students presented their results. Using a similar model students will have access to air quality sensors and related resources, including data analysis tools such as AQPortal through the Library Program. AQ-SPEC staff will also lead trainings and provide technical and subject-matter expertise throughout the project. The specific activities of the students will be tailored to the needs and capacity of their partner communities. For example, some communities may benefit from assistance planning monitoring and installing sensors, while others may prefer assistance with data analysis, writing reports, and drafting action plans. These activities will result in the deployment of 10-20 long-term stationary sensors per community per year (over two years, approx. 100 total) and access to locally relevant real-time data. Furthermore, this work will help establish a model for monitoring and engagement that could continue to be utilized by the Library Program to ensure successful future collaborations with communities. Finally, the expanded Library Program will enable sustained support for partner communities beyond the project period (including continued data access and sensor maintenance) and a mechanism to pursue enhanced monitoring in other EJ communities.

B. Project Significance: Historically, air quality in Southern California has ranked among the poorest in the Nation, especially with regards to particulate matter and ozone [6]. While policy and regulatory actions have substantially improved air quality in the region, communities in the South Coast Air Basin continue to be disproportionately exposed to higher levels of air pollution, often due to local sources [7,8]. For example, a 2018 report by the CalEPA cited heavy diesel truck traffic and local operations (e.g., recycling, manufacturing, and industrial activity) as air quality concerns in the partner community of Pomona [9]. Furthermore, of the 36 census tracts in Pomona, all 36 are identified as Communities of Concern, 33 are identified as Environmental Justice Areas, and 28 are identified as Disadvantaged Communities [10]. A key concern in Riverside is growing logistics operations. Currently over 40% of the Nation's goods flows through the area, transported by diesel operated trains and heavy-duty truck operations, which substantially increases the particulate pollution levels. As the communities of Pomona and Riverside are in the central and eastern portions of the Air Basin (30 and 50 miles east of central Los Angeles respectively), onshore winds can transport emissions from the densely populated western region, contributing to high secondary organic aerosol and ozone levels [11]. By contrast, Vista Hermosa is small community located close to downtown Los Angeles bordered by two major roadways and four-level interchange. Residents' concerns related to air quality in Vista Hermosa include traffic emissions, local development projects, and loss of greenspace. A better understanding of air quality issues in these communities is the first step toward mitigation. The deployment of sensor networks can provide

hyperlocal information and increase the spatial/temporal resolution of air quality data. Studies have demonstrated the ability of sensor networks to identify statistically significant differences in air pollutant levels and identify hotspots on small spatial scales [12,13]. Thus, the proposed work will combine high-density sensor networks with the expertise of the local community, which includes valuable information on potential sources and temporal trends. This approach will result in data that can inform targeted strategies for reducing emissions and exposure. These networks will also increase the availability of locally relevant data to support personal decision making during major events, such as wildfires. The data from certain sensors can be incorporated into existing products such as the South Coast AQMD's gridded AQI map (currently PurpleAir PA-II's, and in the future Aeroqual AQY's) and the US EPA's Fire and Smoke map (currently PurpleAir PA-II's) [14,15]. These products offer real-time data with associated health messaging. For the appropriate sensor types, project staff will ensure data is incorporated into these products (i.e., data will be publicly available, and the sensors will be maintained). Community members participating in the project will receive information and training on these products in addition to the AQPortal data dashboards. Partnering with local organizations will ensure high need residents in these EJ communities who may benefit the most from this information are engaged. These residents may include those most impacted by local air quality issues (e.g., living near sources), those with pre-existing respiratory conditions, and those who have not previously had access to this type of information (e.g., due to language barriers). Implementing community-based monitoring that engages residents will help to ensure that locally relevant strategies to improve air quality are developed.

Section 2 – Community Involvement

A. Community Partnerships: South Coast AQMD: Staff will be responsible for the development and implementation of the Library Program, which includes obtaining and preparing sensors, tracking, and maintaining data quality, and managing the AQPortal platform for sensor data. In addition, staff will serve as technical and subject matter experts. Finally, staff will oversee the project, including tracking milestones, reporting, and managing the budget/subawards. These activities are in-line with the Agency's overall mission. Finally, the Library Program offers a mechanism to maintain these relationships with partners and continue to offer technical support and data access beyond the project period. City of Pomona, Development Services, Planning Division: Staff from the City of Pomona will serve as a liaison to the community partners in Pomona. This partner will be utilizing two part-time staff members to support the proposed work (a Public Health Fellow and a Community Health Worker). In addition to supporting engagement and monitoring activities, both staff will assist with the translation of materials from the South Coast AQMD's Sensor Educational Toolkit into Spanish. The Public Health Fellow will also aid in the development of policies that can meaningfully address air quality impacts in Pomona communities through an inter-departmental strategy embedding the public health framework into decisions related to Development Services, Neighborhood Services, Economic Development, Policing, and Code Enforcement. Day One: The proposed work is for a Community Health Worker who will be based at Day One. This Community Health worker will support engagement with youth, non-native English speakers, and historically under-represented populations in Pomona. They will also assist with technology implementation, data analysis/interpretation, and policy development. Clean&Green Pomona: This partner will host community workshops, advise on monitoring (e.g., sensor siting), and lead a Community Stories project – ensuring the residents of Pomona are engaged and benefit from the proposed monitoring activities. Roberts Environmental Center (REC) at Claremont McKenna College: One student team from this research center will be working with partners in Pomona to enhance the value of the air monitoring by conducting data analysis, compiling reports tailored to community interest and concerns, and helping to develop other products for the community. Student from the REC have previously worked with South Coast AQMD to assist communities with monitoring efforts. The students will benefit from enhanced skills relating to environmental monitoring, data analysis, communicating scientific information to the public,

and participating in a project involving diverse partners. The University of California of Riverside's College of Engineering, Center for Environmental Research and Technology (CE-CERT): Under a previous grant from the California Air Resources Board (CARB); CE-CERT and the Center for Healthy Communities (CHC) established a Community Air Board (CAB) to foster meaningful community involvement and engage all groups equitably in the research and education process. CE-CERT also worked with the Riverside Unified School District (RUSD) to build a program that includes curriculum and mentorship by UCR undergraduates to support the use of sensors by high school students. Under the proposed work, CE-CERT will coordinate the inclusion of the CAB, and support UCR undergraduates as the Sensor Library Program is leveraged to enable air monitoring projects led by high school students. CE-CERT will also facilitate the participation of four to five RUSD high school teachers (who are current partners of CE-CERT) over the two years of monitoring activities. This participation will include students collecting and analyzing data from sensors, leveraging previously developed curriculum and support from undergraduate mentors and South Coast AQMD staff. Each year will conclude with a summit, where students will present their research to the community. Community Air Board (CAB): This board includes community members, stakeholders, and CBOs with varying expertise on climate change, air quality and public health. Throughout the proposed work, the CAB will advise on monitoring activities and participate in discussions of results, which supports the group's objective of developing strategies to engage the community, understand needs, and effectively address the health impacts related to poor air quality in the Inland Empire. City of LA, Mayor's Office: This partner will serve as a liaison to community partners in Vista Hermosa and assist with identifying additional partner communities. This partner will leverage the Data Science Federation (DSF) (https://dsf.lacity.org/) to recruit undergraduate students to support communities in the City of Los Angeles with monitoring and data analysis/interpretation. The DSF is a partnership program with Los Angeles area colleges and universities, managed by the City, that gives students the opportunity to apply their skills and learn by working with government partners on real-world issues. Finally, this partner will support deployment logistics (e.g., installing sensors at public sites). Vista Hermosa Community Group: This group of residents formed to address local environmental issues and they aim to keep the residents of this community informed and improve public health. This partner will facilitate community engagement in Vista Hermosa throughout all stages of the project. They will also identify and enable opportunities to broaden the project's impact (e.g., by involving local K-12 students).

B. Community Engagement: The proposed work will utilize a variety of approaches to engage residents of the partner EJ communities and meaningfully incorporate their perspectives. In Pomona, we will work with a Community Health Worker, who will lead efforts at a local non-profit. Additionally, education and outreach events will also be held to recruit participants who may wish to host an air quality sensor or serve on CSCs. Another partner in Pomona will lead a Community Stories Project to collect residents' air quality experiences and increase engagement. In Riverside, the proposed work will leverage a previously developed program in which undergraduate students mentor high school students as they lead air monitoring projects in their communities. The project will also leverage an established Community Air Board that includes residents, community-based organizations, and other stakeholders. In Vista Hermosa, partners will leverage local contacts to build a sensor network that serves their residents. All approaches to engagement will rely on partners in each community with a history of local organizing, knowledge of the communities' key environmental and health issues, and longstanding relationships with residents. Furthermore, a similar partnership structure will exist in each community that includes local community partners who will help engage residents, support from academic partners that will expand local capacity, and additional facilitation and access to tools, resources, and expertise through governmental partners. Over the course of the project, the engagement with each community will follow a similar trajectory through a series of meetings, workshops, and trainings, the schedule and of which will be defined with each partner community at the beginning of the project. This series of meetings, workshops, and trainings

will offer the opportunity for community members to share their local knowledge and expertise as well as their questions and concerns about local air quality. This information will then shape the monitoring activities. The meetings, workshops and trainings will create opportunities for those leading the monitoring (i.e., sensor deployments) to provide progress updates, preliminary data, and training on initial data dashboards. Community members will also be able to advise on what types of final products or analysis would be most useful, or how data dashboards can be customized to most benefit the community. Finally, these meetings, workshops, and training will provide a chance to discuss results, final products developed for the community, and actions or strategies for improving local air quality. This series of meetings will follow a similar model as was found to be successful in the previously discussed STAR Grant project. In the previous project, South Coast AQMD's AQ-SPEC led a series of meetings with the partner communities (33 total), consisting of a pre-deployment/training, during-the-deployment, and post-deployment workshops. Leaning on this experience, South Coast AQMD staff will work with community leads to facilitate meetings, advise partners on presenting data to communities (e.g., intuitive data visualizations), and ensure needs (e.g., translation) are met. Similar approaches to engagement (e.g., CSCs) are being utilized successfully by the AB 617 Program at the South Coast AQMD. This program's activities informed the selection of EJ partner communities as project leads selected communities not currently participating in the AB 617 Program to better distribute funding and resources among underserved communities in our region and to expand the reach of our existing pilot Library Program.

Section 3 – Environmental Justice and Underserved Communities: The three partner communities of Pomona, Riverside, and Vista Hermosa face disproportionate health outcomes from pollution, the impact of the covid-19 pandemic, and other socioeconomic factors. This is affirmed by CalEnviroScreen 4.0, a health screening tool developed by the California Office of Environmental Health Hazard Assessment (https://oehha.ca.gov/calenviroscreen). The CES (CalEnviroScreen) score, which is calculated by census tract and includes pollutant exposure indicators, environmental impact indicators, sensitive population indicators, and socioeconomic factors, reveals how the partner communities compare to the rest of the state. The median CES scores for census tracts in Pomona, Riverside, and Vista Hermosa, respectively, fall into the 89th, 71st, and 93rd percentiles, indicating a relatively high need considering pollution burden and population characteristics. Furthermore, 12 out of 31 census tracts in Pomona, 12 of 64 census tracts in Riverside, and 3 of 5 census tracts in Vista Hermosa rank above the 90th percentile for the CES score when compared to all census tracts in the state. Regarding the pollution burdens due to poor air quality, Pomona and Vista Hermosa rank in the 92nd and 90th percentile for $PM_{2.5}$ exposure respectively, and Riverside ranks in the 92nd and 95th percentiles for $PM_{2.5}$ and O_3 exposure (using the median census tract data). Thus, these communities face a high potential for exposure to elevated levels of $PM_{2.5}$ and O_3 as compared to the result of the state. These risks from pollutant exposure are compounded by other health and socioeconomic factors. For example, there are census tracts in each community ranking upwards of the 80th or 90th percentile in terms of the prevalence of health issues such as asthma, low birth weight, and cardiovascular disease, as well as socioeconomic factors such as the prevalence of poverty, unemployment, linguistic isolation, and the proportion of the population with less than a high school education. Though air quality sensors are commercially available and cost orders of magnitude less than conventional monitoring equipment, there remain barriers to the uptake of this technology, especially in EJ communities. For example, studies have demonstrated that most air quality sensors tend to be sited in higher-income areas [17,18]. In the previous STAR Grant project, participants were provided with sensors and the same training materials/support, but lower installation rates were seen in communities facing higher socioeconomic and pollution burdens. The deployment of sensors in partner communities under this proposed work will reduce the disparity of access to local air quality data and information. In Pomona and Vista Hermosa, though a few sensors are present there have been no systematic deployments. In Riverside, under the previous CARB grant, sensors were deployed at partner schools in clusters for limited

periods, but requests from the community continue to indicate the interest and demand for such tools. The Library Program will address these barriers to air quality sensor use through the "one-stop-shop" approach, which includes the technology, support, and resources such as educational materials. Regarding recent events, the covid-19 pandemic has further highlighted the disparities faced by EJ communities. For example, multiple studies have demonstrated a link between higher $PM_{2.5}$ pollution and higher rates of covid-19 [19,20], one of the pollutants to be measured under the proposed work. For communities that rank high on the list of those disproportionately burdened by and vulnerable to multiple sources of pollution, the investment in air monitoring and community trust building is imperative to addressing environmental justice issues and working toward the reduction of disproportionate health outcomes. In addition, building relationships with the South Coast AQMD will increase partners knowledge of and access to resources, build capacity, and help them find a seat at the table to influence future projects that affect their communities.

Section 4 – Environmental Results—Outcomes, Outputs and Performance Measures

A. Expected Project Outputs and Outcomes: The main output of the proposed work is enhanced air monitoring in partner EJ communities through the deployment of approximately 100 sensors that target select pollutants of greatest concern ($PM_{2.5}$, PM_{10}, O_3, or NO_2). Real-time, processed (QC'd and calibrated) data from these sensors will be accessible through our AQPortal's public-facing dashboards. To enhance the usefulness of the air monitoring, additional outputs will consist of the community-specific reports presented to community members and made publicly available. Other direct outputs benefitting partner EJ communities include co-developed action plans to reduce emissions/exposure, capacity building, and new relationships with the South Coast AQMD. The final set of expected outputs relates to the Library Program. The key output being an expanded South Coast AQMD-led Library Program that makes sensors available to the public for no-cost loans accommodating both short-term loans (i.e., days – weeks) and long-term deployments (i.e., months or longer, depending on monitoring goals). Sensor-specific QC and calibration procedures will be applied and published on the AQ-SPEC website. Regarding the education resources, the proposed work will result in the availability of a multi-lingual Sensor Educational Toolkit. In terms of short-term outcomes, the proposed work will provide partner EJ communities with increased access to locally collected air quality data and increased awareness of resources (e.g., South Coast AQMD's gridded AQI map). Projects will result in a better understanding of local air quality issues, which may include identifying sources of concern, hot-spots, or important temporal trends. These short-term outcomes will enable the longer-term outcomes of community and individual actions, informed by the data and guided by the action plans, to reduce emissions and exposure. This long-term outcome will be further bolstered by continued access to local real-time data, made possible due to the support through the Library Program. In the short term, the participating students will enhance their STEM and communication skills. In addition, they will gain experience working with EJ community partners and in community/government collaborations. These skills and experiences will prepare the students to work with underserved populations in their future. At the end of the project period, the Library Program will offer accessible and supported air monitoring to residents of the South Coast AQMD region and can serve as a model for similar programs. The successful engagement of residents in the partner EJ communities represents another short-term outcome. In the long-term, these participants will be knowledgeable about the work that occurred during the project period and well-equipped to oversee the implementation of action plans or advise on future work. Furthermore, the new partnerships established between the CBOs, communities, and the South Coast AQMD will better position these communities to be involved in future collaborations. Building on this experience, the Library Program will continue to serve as a mechanism for establishing and building relationships between communities and South Coast AQMD – leading to the greater involvement of these residents in future work intended to "clean the air and protect the health of all residents in the South Coast Air District through practical and innovative strategies".

B. Performance Measures and Plan: Performance measures related to the expected outputs may be found in the Logic Model on the final page, and the Milestone Timeline (Section 4C) indicates when these items will be completed. South Coast AQMD project leads will track these measures and provide updates in the quarterly reports to EPA. Another set of measures relate primarily to project outcomes; these measures include the collection of qualitative and quantitative feedback at meetings, workshops, and trainings. A set of pre/post surveys deployed to student participants each year will assess their experiences and the development of new skills. Each year, pre/post surveys deployed to community participants will assess increases in awareness of local air quality issues, knowledge of how to access data and relevant resources, and their overall experience. Pre/post interviews with lead community partners will inform the effectiveness of the project and any invite recommendations. Finally, South Coast AQMD staff will capture additional feedback in written summaries of meetings, trainings, and workshops. This feedback will aid project leads in assessing and improving the project and Library Program. The final performance measures include annual reports to South Coast AQMD by all sub awardees/contractors to detail the use of funds, project lessons, and project impact. In addition to sharing results and lessons learned in the quarterly and final reports to EPA, all partners will help to disseminate this information through conference presentations, publications, and public outreach events, and meetings.

C. Timeline and Milestones

Milestone Timeline (project period: Jan 1, 2023 - Dec 31, 2025)	Responsible Partners	Project Year 1				Project Year 2				Project Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Purchase and inventory sensors	AQMD	3/31											
Establish and finalize QC/calibration procedur	AQMD		6/30										12/30
Translate and finalize Toolkit materials	AQMD/City			8/30									12/30
Initial coordination meeting with partners	all partners		5/30										
Meetings, workshops, and trainings	all partners			(ongoing, schedule will vary by community)									
Sensor selection and deployment	AQMD/Acd./CBOs			10/30				10/30					
Data available on data dashabords	AQMD				10/30	3/30			10/30	3/30			
Complete data analysis and final reports	Acd./CBOs						4/30				4/30		
Complete action plans to improve air quality	all partners											7/30	
Collect survey/interview data	AQMD			(Pre)			(Post)	(Pre)			(Post)		
Annual reports from sub-awardees	CBOs/Acd./cont.				12/30				12/30				12/30
Complete and submit quarterly reports (EPA)	AQMD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Complete 'Detailed Final Report' (EPA)	AQMD												TBD
Disseminate results and final products	all partners												Ongoing

Acd. = Academic Partners, CBOs = Community Leads, City = governmental partners (dates indicate milestone deadline)

Section 6 – Programmatic Capability and Past Performance

A. Past Performance: The South Coast AQMD is currently completing work awarded under the US EPA STAR Grant Program (agreement number: RD83618401) for a project entitled: "Engage, Educate, and Empower California Communities on the Use and Applications of "Low-cost" Air Monitoring Sensors". As the lead, South Coast AQMD staff effectively managed the project, including coordinating with CO-PIs from other institutions. The four main aims of the proposed work were successfully achieved. Through no-cost extensions, AQ-SPEC staff was able to expand the project's scope (e.g., by engaging 14 different communities rather than the six proposed). The scope was also expanded through the initial development of the AQPortal cloud platform and project work with external partners to develop the AirSensor package (a free and open-source, R-based code package) and DataViewer tool. The final product of the STAR Grant was the "Community in Action: A Comprehensive Educational Toolkit on Air Quality Sensors", published on the AQ-SPEC website. The experiences and tools have continued to support deployments with

communities (e.g., with AB 617 communities). The South Coast AQMD completed work on a Mobile Sensing Project in collaboration with the Google Earth Outreach program. As the technical lead, South Coast AQMD's AQ-SPEC developed a mobile testing platform with reference monitors, sampling equipment, and the necessary infrastructure for mounting and testing sensors on a vehicle. The project has resulted in the development of an innovative protocol for testing air sensor performance in mobile deployments. The South Coast AQMD is currently completing work awarded under the US Department of Energy's Building America Program for developing standard test methods for evaluating $PM_{2.5}$ and CO_2 sensors for indoor air applications. As the technical lead, South Coast AQMD's AQ-SPEC developed the framework for the standard test methods, conducted laboratory activities to inform feasibility, and addressed technical commentary that satisfied various stakeholders. The test method for $PM_{2.5}$ sensors has been completed, resulting in the creation of a new ASTM International test standard. Results and products from all projects have been or are in the process of being disseminated through publications, conference presentations, and the AQ-SPEC website (http://www.aqmd.gov/aq-spec). Two additional EPA-funded projects underway at the South Coast AQMD are "Design and Development of a Novel Mobile Platform for Time-resolved Air Toxics Measurements: Application for Community-scale Monitoring and Source Apportionment" (awarded under RFP: EPA-OAR-OAQPS-20-05) and "Application Of Next Generation Air Monitoring Methods To Characterize Hazardous Air Pollutant Emissions From Refineries and Assess Potential Impacts To Surrounding Communities " (awarded under RFP: EPA-OAR-OAQPS-15-01). Both projects are being completed successfully and according to the established timetable.

B. Reporting Requirements: For the STAR Grant project, leads at the South Coast AQMD submitted annual reports on time, according to the timetable defined by the US EPA; these included progress updates as well as revisions and additional materials as requested by the EPA Project Officer. For the Mobile Sensing Project, leads at the South Coast AQMD submitted periodic reports on time at the request of the collaborator, Google Earth Outreach; these included progress updates on mobile platform development, sensor testing, data analysis, and protocol development. Leads at the South Coast AQMD submitted periodic reports on time at the request of the collaborator, ASTM International, which included updates on progress toward method development and testing, reports on intra-laboratory studies of sensor evaluations under the test methods, responses to reviewer comments, and revisions to the test standards.

C. Staff Expertise: South Coast AQMD staff, and especially the AQ-SPEC Program, have extensive experience and expertise in developing and implementing procedures and methods guiding air quality sensor performance evaluation in the laboratory and field, deploying and maintaining large sensor networks intended for ambient monitoring, (including tracking sensor health and applying QC and calibration procedures), working with external contractors to build data management/analysis/display solutions, leading education and outreach (including trainings/workshops), facilitating community meetings, and communicating data or results to the public. This includes extensive experience building partnerships with six large communities over the past three years through the AB 617 Program. Finally, staff have experience managing large federal awards and assistance agreements. (see CVs for more detail)

Section 7 – Budget

B. Reasonableness of Costs: (see budget detail below) **Supplies**: This will support the purchase of sensors, sensor supplies, and other lab consumables that will enable monitoring during the project and will enable both air monitoring during the project period and for the Library Program to continue operating beyond the project period. A variety of sensors will be purchased that meet the criteria outlined in the Quality Assurance Statement. **Contractual**: This funding will support the development of new and enhancements to existing solutions for data storage, management, analysis and visualization. For example, enabling the AQPortal platform to take in, store, and process data from new sensor types, as well as the creation of new and customized data dashboards for community partners. Aeroqual Ltd. will help integrate and apply

remote calibration and network management tools for sensors from multiple vendors on the AQPortal – ensuring high data quality. Aeroqual Ltd. is ideally suited to carry out this work based on a history of collaboration with South Coast AQMD developing and optimizing these remote calibration techniques, techniques which have been documented in the scientific literature. **Other**: This funding will primarily support community engagement and capacity building. Subawards to partners will enable the participation of a Community Health worker and community members in the project (e.g., space rental costs, stipends for community air board members, printing costs for educational materials, efforts such as Community Health Stories). These funds will support partners at the City of LA as they assist with the deployment of sensors in public locations, provide access to a software that will allow for the translation of the Sensor Guidebook into Spanish (which will require extensive formatting), and support outreach efforts including the dissemination of results and lessons. **Personnel:** Personnel costs, fringe benefits and indirect costs will not be charged by the South Coast AQMD on this project. However, Dr. Vasileios Papapostolou (Principal Investigator) will have the responsibility for the overall design, implementation, and coordination of the project and for ensuring effective interactions among project partners. AQS and AQIS II staff involved in the project will be responsible for managing the Sensor Library Program (including laboratory activities), managing sensor data and data dashboards using the AQPortal cloud platform, and coordinating various educational outreach activities. South Coast AQMD senior personnel including Dr. Andrea Polidori (Director of Monitoring and Analysis) and Dr. Jason Low (Assistant Deputy Executive Officer) of the Science and Technology Advancement Division will provide support and oversight to ensure the project's success and will facilitate the involvement of other district staff as needed. Costs related to access and use of field and laboratory equipment will also be provided in-kind. This includes the use of a new state-of-the-art environmental chamber system, maintained, and operated by South Coast AQMD's AQ-SPEC and capable of simulating variable air pollutant concentrations, atmospheric conditions (incl. temperature, humidity, and pressure), and wind speeds.

A. Budget Detail

	Line Item & Itemized Cost	EPA Funding
Supplies	Air quality sensors (250 total, costing $200 to $4999 each, for different applications)	$ 125,000.00
	Sensor supplies (e.g., android phones, protective cases for short term loans, etc.)	$ 6,000.00
	Lab consumables	$ 5,000.00
	Total Supplies	$ 136,000.00
Contractual	Data Management and Visualization	$ 80,000.00
	Aeroqual Contract	$ 30,000.00
	Total Contractual	$ 110,000.00
Other	Subaward for Community Health Worker (Day One)	$ 53,000.00
	Subaward for Pomona (Clean&Green Pomona)	$ 10,000.00
	Subaward for Riverside (University of CA, Riverside)	$ 45,000.00
	Subaward for Vista Hermosa (Vista Hermosa Community Group)	$ 45,000.00
	Subaward for fourth community partner	$ 45,000.00
	Subaward for City of LA, Mayor's Office	$ 20,000.00
	Outreach Activities (e.g., workshops, public meetings)	$ 25,000.00
	Participant Support Costs (for hosting sensors, @ $100 per host)	$ 10,000.00
	Software for translating Sensor Guidebook (Adobe InDesign, 3 years access)	$ 900.00
	Total Other	$ 253,900.00
	Total Funding Requested	**$ 499,900.00**
	Total Project Cost	**$ 499,900.00**

C. Expenditure of Awarded Funds: Leads will ensure the appropriate distribution and use of funds in a timely manner. A Financial Analyst will provide financial support and reporting.

Abbreviated Logic Model – Outputs, Outcomes, and Performance Measures

MAIN Objectives	OUTPUTS	SHORT-TERM OUTCOMES	LONG-TERM OUTCOMES	PERFORMANCE MEASURES
(1) Enhance and expand a pilot Sensor Library Program	- A Library Program offering no-cost loans (along with technical support, resources, and data quality procedures) - QC and calibration SOPs - Multi-lingual Sensor Educational Toolkit	- Accessible air monitoring supported by South Coast AQMD - A model and resources for other loan programs	- Expanded air monitoring in EJ communities - A mechanism for building community/AQMD relationships - Increased robustness of other library and loan programs	- 100 sensors available for short-term loan - 100 sensors prepared for long-term loan - Sensor-specific QC/calibration procedures published on AQ-SPEC website - Chamber II prepared to support Program - Educational Toolkit available in Spanish - Promotion of the Library Program to public
(2) Engage communities to improve air quality	- Action plans and strategies for improving local air quality - Products such as, 'Community Health Stories' - Community capacity building - New partnerships between underserved communities and South Coast AQMD	- Increased awareness of information such as AQMD resources and useful educational materials - Identification of or a better understanding of a local air quality issues - Formation of community-specific CSCs	- Community-led action to reduce personal exposure or local emissions, leading to improved air quality - Knowledgeable residents can guide implementation of action plans - Community partners and residents well positioned to join in future collaborations	- Engage 4 EJ communities - Engage residents though CSCs or other means in each community - Conduct 3 meetings, workshops, or trainings per year/group (approx. 24 total) - Completion of co-developed action plans - Completion of pre/post surveys, interviews, and meeting summaries
(3) Empower students in STEM learning opportunities around air quality monitoring in support of communities	- Enhanced monitoring in partner EJ communities - Real-time data, supplemental datasets, and reports speaking to CSC identified air quality questions and concerns	- Increased access to locally relevant data/reports that can inform actions to reduce emissions/exposure *For students,* - Enhanced STEM skills, and experience working w/ EJ communities and government partnerships	- Continued access to real-time data and technical support for deployed sensors, supported by AQMD via the Library Program *For students,* - Ability to integrate work with EJ communities into future careers - Successful engagement in multi-institutional partnerships	- Recruit student teams (one per community) - Installation of 100 long-term, outdoor, stationary sensors over project period - Real-time data available within one month of sensor installation, via AQPortal - Completion of reports/presentations tailored to communities' concerns - Completion of pre/post surveys by students

References: [1] Papapostolou et al., 2017 (DOI: 10.1016/j.atmosenv.2017.10.003); [2] Feenstra et al., 2019 (DOI: 10.1016/j.atmosenv.2019.116946); [3] Collier-Oxandale et al., 2020 (DOI: 10.1016/j.atmosenv.2019.117092); [4] Feenstra et al., 2020 (DOI: 10.1016/j.atmosenv.2019.117092); [5] Collier-Oxandale et al., 2022 (DOI: 10.1016/j.envsoft.2021.105256); [6] Fann et al., 2012 (DOI: 10.1111/j.1539-6924.2011.01630.x); [7] Anderson et al., 2018 (DOI: 10.1021/acs.est.8b00908); [8] Marshall et al., 2014 (DOI: 10.1021/es405167f); [9] https://calepa.ca.gov/wp-content/uploads/sites/6/2018/09/Pomona_EJ_Initiative_FINALweb.pdf ; [10] https://scag.ca.gov/sites/main/files/file-attachments/fconnectsocal_environmental-justice.pdf?1602625867; [11] Hasheminassab et al., 2014 (DOI: 10.5194/acp-14-12085-2014); [12] Tanzer et al., 2019 (DOI: 10.3390/ijerph16142523); [13] Mousavi et al., 2021 (DOI: 10.3390/ijerph18115735); [14] Schulte et al., 2020 (DOI: 10.1088/1748-9326/abb62b); [15] Barkjohn et al., 2021 (DOI: 10.5194/amt-14-4617-2021); [16] (https://storymaps.arcgis.com/stories/c5b6b05808014b5a9e24cf82b2a4dd1b); [17] Mullen et al., 2022 (DOI: 10.1016/j.envres.2021.112612 [18] deSouza et al., 2021 (DOI: 10.1038/s41370-021-00328-2); [19] Comunian et al., 2020 (DOI: 10.3390/ijerph17124487); [20] Wu et. Al., 2020 (DOI: 10.1101/2020.04.05.20054502)

NUMBER 22.0 – HARASSMENT/DISCRIMINATION/RETALIATION

Effective: August 21, 2018

Approved By: Wayne Nastri, Executive Officer

22.1 POLICY STATEMENT:

It is the policy of the South Coast Air Quality Management District ("SCAQMD") to provide its employees a work environment that is free from all forms of unlawful employment discrimination, harassment, and retaliation, and that promotes an atmosphere of mutual respect and professionalism.

SCAQMD will not tolerate in the workplace or in work-related situations: discrimination or harassment based on race, ethnicity, religion, color, national origin, ancestry, physical or mental disability, medical condition, genetic information, marital status, registered domestic partner status, pregnancy, sex (including childbirth, breast feeding, and related medical conditions), age, gender, gender identity or expression, sexual orientation, uniform service membership, veteran status, or any other characteristic protected by state or federal employment discrimination laws. This includes conduct by any SCAQMD employee, supervisor or manager, or any intern or other non-employee, such as contractors, vendors providing services to SCAQMD, and others doing business with SCAQMD. Further, SCAQMD does not tolerate unlawful discrimination or harassment by its employees of non-employees with whom SCAQMD has a business or service relationship. Retaliation against any individual for making a report, or for participating in an investigation under this policy is strictly prohibited.

22.2 TYPES OF PROHIBITED CONDUCT:

By way of illustration only, and not limitation, some examples of conduct prohibited by this policy include:

(1) Verbal Harassment - epithets, derogatory comments, slurs, unwanted comments, inappropriate jokes, unwanted invitations or sexual advances, threats, and negative stereotypes.

(2) Physical Harassment - assault, touching, impeding or blocking movement, or any physical interference with normal work or movement.

(3) Visual Forms of Harassment - derogatory posters, notices, cartoons, drawings, photographs, writings, graffiti, gestures, e-mails, and text messages.

(4) Inappropriate Use of Technology – using the Internet, the e-mail system or telephone and/or voicemail systems, text messages, blogging or any other technological means to transmit, communicate, post or receive: (a) sexually-suggestive, pornographic or sexually explicit pictures, messages or materials or other materials prohibited by this policy; (b) or pictures, messages or other materials that denigrate, threaten, or show hostility or aversion towards an individual or group based on race, national origin, sex, sexual orientation or any other protected characteristic under the law and this policy.

(5) Retaliation by any of the above means for having reported harassment or discrimination, or having assisted another to report harassment or discrimination.

An employee's intentions, such as not meaning to give offense or a belief that conduct was welcomed, will not excuse behavior that is found to violate this policy.

22.2.1 Examples of Sexual Harassment

Sexual harassment includes a broad spectrum of conduct including harassment based on sex, gender, gender transition, gender identity or expression, and sexual orientation. By way of illustration only, and not limitation, some examples of unlawful and prohibited behavior include:

- Unwanted sexual advances;
- Offering an employment benefit (such as a raise, promotion, or career advancement) in exchange for sexual favors, or threatening an employment detriment (such as termination or demotion) for an employee's failure to engage in sexual activity;
- Visual conduct, such as leering, making sexual gestures, and displaying or posting sexually suggestive objects, pictures, cartoons, or posters;
- Verbal sexual advances, propositions, requests, or comments;
- Sending or posting sexually-related messages or videos via email, text, instant messaging, or social media;
- Verbal abuse of a sexual nature, graphic verbal comments about an individual's body, sexually degrading words used to describe an individual, and suggestive or obscene letters, notes, or invitations;
- Physical conduct, such as touching, groping, assault, or blocking movement;

- Physical or verbal abuse concerning an individual's gender, gender transition, gender identity, or gender expression; and

- Verbal abuse concerning a person's characteristics such as pitch of voice, facial hair or the size or shape of a person's body, including remarks that a male is too feminine or a woman is too masculine.

22.2.2 Examples of Harassment Based on Other Protected Characteristics

SCAQMD strictly prohibits harassment concerning race, religion, disability, age, veteran status, or any other protected characteristic. By way of illustration only, and not limitation, such prohibited harassment includes:

- Racial or ethnic slurs, epithets, and any other offensive remarks;

- Inappropriate jokes, whether written, verbal, or electronic;

- Threats, intimidation, and other menacing behavior;

- Inappropriate verbal, graphic, or physical conduct;

- Sending or posting harassing messages or videos via email, text, instant messaging, or social media; and

- Other harassing conduct based on one or more of the protected categories identified in this policy.

If you have any questions about what constitutes harassing behavior, ask a Human Resources Manager, your supervisor, or a manager.

22.3 PROHIBITION AGAINST RETALIATION:

Individuals are protected by law and SCAQMD policy from retaliation for opposing unlawful discriminatory practices, for filing an internal complaint under this policy or for filing a complaint with the state or federal agency charged with enforcing anti-discrimination laws, or for otherwise participating in any proceedings conducted by SCAQMD under this policy and/or by either of such governmental agencies.

SCAQMD is committed to prohibiting retaliation against those who themselves, or whose family members report, oppose, or participate in an investigation of alleged unlawful harassment, discrimination, or other wrongdoing in the workplace. By way of example only, participating in such an investigation includes, but is not limited to:

- Filing a complaint with a federal or state enforcement or administrative agency;

- Participating in or cooperating with a federal or state enforcement agency conducting an investigation of SCAQMD regarding alleged unlawful activity;
- Testifying as a party, witness, or accused regarding alleged unlawful activity;
- Making or filing an internal complaint with SCAQMD regarding alleged unlawful activity;
- Providing notice to SCAQMD regarding alleged unlawful activity; and
- Assisting another employee who is engaged in any of these activities and participating in an investigation.

SCAQMD is also committed to prohibiting retaliation in related circumstances, including but not limited to:

- Qualified employees who request a reasonable accommodation for any known physical or mental disability;
- Employees who request a reasonable accommodation of their religious beliefs and observances; and
- An employee who is a victim of domestic violence, sexual assault, or stalking and requests leave time or changes in the workplace to ensure the employee's safety and well-being.

22.4 REPORTING PROCESS:

Anyone who believes that he/she has been harassed or discriminated against should immediately report such incidents to a supervisor, a manager, a Human Resources Manager, an attorney in the General Counsel's Office, or the Assistant DEO/Administrative and Human Resources.

Any employee who observes or overhears discrimination or harassment by another employee, supervisor, manager, or non-employee should report the incident immediately to the individual(s) listed above.

If a person believes that he or she has been retaliated against in violation of this policy, the person should immediately report the matter to a supervisor, a manager, a Human Resources Manager, an attorney in the General Counsel's Office, or the Assistant DEO/Administrative and Human Resources.

22.5 INVESTIGATING COMPLAINTS:

Incidents or concerns relating to discrimination, harassment, or retaliation, as defined by this policy, should be reported in a timely manner so that appropriate steps to address the situation may be taken. Reports can be made to a supervisor, a manager, a Human Resources Manager, an attorney in the General Counsel's Office, or the Assistant DEO/Administrative and Human

Resources. SCAQMD takes all complaints of unlawful harassment, discrimination, or retaliation seriously and will not penalize an employee or retaliate against an employee in any way for reporting harassment, discrimination, or retaliation complaints in good faith.

The Assistant Deputy Executive Officer/Administrative and Human Resources or the Executive Officer will conduct an investigation by assigning an impartial and qualified person (which may include an outside investigator, when deemed necessary or appropriate) and take steps to ensure the investigation is conducted as promptly as possible under the circumstances. Upon conclusion of such investigation, appropriate corrective action will be taken, where warranted. SCAQMD prohibits employees from hindering internal investigations and the internal complaint procedure. All complaints of unlawful discrimination, harassment, or retaliation that are reported to the individuals listed above will be treated as confidentially as possible, consistent with SCAQMD's need to conduct an adequate investigation.

Findings of conduct that violate this policy will result in appropriate corrective action that could involve, in the case of employees, discipline up to and including termination of employment; or, for non-employees, the termination of the contract or business relationship. Additionally, under California law, employees may be held personally liable for harassing conduct that violates the California Fair Employment and Housing Act.

22.6 RESPONSIBILITIES UNDER THIS POLICY:

Managers and supervisors are responsible for implementing this policy, including: taking necessary steps to prevent or correct unlawful employment discrimination, harassment, and retaliation, as described above; keeping subordinates informed of SCAQMD's policy against discrimination, harassment, and retaliation; and promptly reporting to a manager, a Human Resources Manager, an attorney in the General Counsel's Office, or the Assistant DEO/Administrative and Human Resources any complaints received, or observations of discrimination, harassment, or retaliation as defined in this policy.

All SCAQMD staff are responsible for complying with this policy, and for conducting themselves in a manner that promotes mutual respect and professionalism.

22.7 ALTERNATIVE REMEDIES:

Employees may also file allegations of unlawful employment discrimination or harassment with the U. S. Equal Employment Opportunity Commission or the California Department of Fair Employment and Housing. The addresses and phone numbers of these offices can be found in the Government section of your local phone directory, or on the internet at https://www.eeoc.gov and https://www.dfeh.ca.gov.

APPROVED:

Wayne Nastri
Executive Officer

21 AUG 2018
Date